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Report to Congress

Monitoring Utilization of and Access to Services for Medicare Beneficiaries Under Physician Payment Reform

Louis W. Sullivan, M.D.
Secretary of Health and Human Services
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Glossary

AHCPR	Agency for Health Care Policy and Research
ASC	Ambulatory surgical center
BMAD	Part B Medicare Annual Data file
BPH	Benign prostatic hypertrophy
CABG	Coronary artery bypass graft
CHF	Congestive heart failure
CPT	Current procedural terminology
CT	Computerized (axial) tomography scan
CWF	Common working file
D&C	Dilation & curettage
EKG	Electrocardiogram
GI	Gastro intestinal
HCFA	Health Care Financing Administration
HCPCS	HCFA Common Procedure Coding System
HMO	Health maintenance organization
HPSA	Health Professional Shortage Areas
ICD-9-CM	International Classification of Diseases - 9th Revision - Clinical Modification
MCBS	Medicare Current Beneficiary Survey
MEDPAR	Medicare Provider Analysis and Review

MEDTEP	Medical Treatment and Effectiveness Program
MPIES	Medicare Physician Identification and Eligibility System
MRI	Magnetic Resonance Imaging
MSA	Metropolitan statistical area
NCH	National Claims History
NCH/PF	National Claims History Physician File
NCH-PSP	National Claims History Physician/Supplier Procedure
NCHS	National Center for Health Statistics
NHIS	National Health Interview Survey
OBRA	Omnibus Budget Reconciliation Act
PORT	Patient Outcomes Research Teams
PRO	Peer Review Organization
PTCA	Percutaneous transluminal coronary angioplasty
SURP	Suprapubic prostatectomy
TURP	Transurethral resection of the prostate
UPIN	Unique Physician Identifier Number

Executive Summary

This report is the second annual report under section 1848(g)(7) to the Social Security Act. This section requires the Secretary of the Department of Health and Human Services to monitor:

- (i) Changes in the utilization of and access to services furnished under this part within geographic, population, and service related categories.
- (ii) Possible sources of inappropriate utilization of services furnished under this part which contribute to the overall level of expenditures under this part.
- (iii) Factors underlying these changes and their interrelationships.

The Secretary is to study and report annually to Congress on changes in utilization and access and on "the factors (including factors relating to different services and specific categories and groups of services and geographic and demographic variations in utilization) which may contribute to such changes."

The Omnibus Budget Reconciliation Act of 1989 (OBRA 1989) made the most significant changes in the way Medicare pays physicians since Medicare began. There are three major changes. First, a Medicare fee schedule is being implemented nationwide during a 1992-95 transition period. Second, continuing a process that began in 1984, limits are being placed on physicians' actual charges so that enrollee liability for balance billing on unassigned claims will be no more than 15 percent of the nonparticipating fee schedule amounts by 1993. Third, OBRA 1989 mandated targeted rates of growth, or Medicare volume performance standards, for Medicare expenditures for physicians' services.

It is clear that the purpose of the annual reports is to monitor the impact of Medicare physician payment reform mandated by OBRA 1989 on changes in access, utilization, and appropriateness of services for Medicare beneficiaries. However, many changes were made in the way Medicare paid physicians before the changes made by OBRA 1989. Moreover, other forces in the health care delivery system unrelated to physician payment policy affect access and utilization for Medicare beneficiaries. Thus, physician payment reform will need to be viewed as part of a continuum of changes in Medicare payment policy and as just one of the many forces that influences access and utilization.

This report discusses various definitions and measures of access. Although ultimately the goal in measuring access is to describe whether or not an individual is able to obtain care when needed, such indicators are not readily available. In this report, access is principally measured by utilization.

The 1991 report to Congress described potential analytical strategies and data bases for monitoring changes in utilization and access. The current report describes the analytical strategy and the approaches that are being used to implement the Secretary's charge. The overall analytical approach will be to examine trends in utilization before and after the implementation of the Medicare fee schedule. A major focus will be on measuring changes in utilization of physicians' services for vulnerable groups of the Medicare population, including minorities, the poor, the oldest age groups, beneficiaries residing in rural areas, those in poor health status, and beneficiaries without Medigap insurance. The primary source of data will be claims submitted to Medicare fiscal agents for services rendered to the beneficiaries. Survey data, which provides information not available in the claims system, will also be used to monitor changes in access.

The need to monitor physician payment reform comes at a time when a fundamental change occurred in the flow and content of information constituting the data system used by the Health Care Financing Administration (HCFA). Currently, data from the processing of Medicare claims are being transmitted to HCFA in a more timely and reliable manner than before. In addition, these claims data now contain more complete information on the procedures that were performed. Also, a unique physician number identifying the physician performing each Part B service under the Medicare program is being implemented. The new Medicare data system has been designated as the National Claims History (NCH). It is clear that the NCH will enhance HCFA's ability to generate more timely, accurate, and comparable information for program administration and evaluation.

This report describes the design and development of a beneficiary-based Part B monitoring system using the NCH. As claims are received in the NCH, the monitoring system will capture these data on a flow basis. The monitoring system has been fully designed and programmed to produce quarterly data beginning with services received January 1, 1992, the implementation date for the fee schedule. For the monitoring system, claims information will first be aggregated into categories that group physician services by type, using a classification system developed jointly by researchers in the Office of Research and Demonstrations in HCFA and at the Urban Institute. The data in the beneficiary-based monitoring system will then be summarized for analysis by Medicare population group and by geographic area. Because this report was being prepared at a time when the monitoring system was relatively new, the types of data and analyses that can be performed with this component of the monitoring system are demonstrated in this report through the use of claims data for 1990 and 1991.

This report also discusses the development of a physician monitoring system which was designed to complement the beneficiary-based monitoring effort. The physician monitoring system has two basic data files. The first file will contain information from 100 percent of the claims summarized for analysis by procedure code at the specialty and Medicare pricing locality level. The second file will contain information for a sample of physicians who serve Medicare beneficiaries. The physician monitoring system will be used to monitor changes in utilization of particular procedures or group of procedures, across various categories of physicians, and across various geographic areas and place of service in those areas.

The report provides an example of the quarterly information the physician monitoring system will be capable of providing from the summarization of the claims data at the procedure, specialty, and locality level. Again, in light of the fact that this report was being prepared when the monitoring system had been underway for only a few months, 1991 data was used for the example. This report also provides an illustration of the type of information that can be monitored from the file based on all of the claims for a sample of physicians. The illustration uses a data base that contains similar but more limited information than the file that will be used to monitor whether changes occurred in physicians' practices.

Once the beneficiary monitoring system has matured and begins to produce data to analyze use of physicians services, trends in the period after the fee schedule was implemented will be compared with the trends that were observed before the fee schedule went into effect. Three chapters of this report are devoted to the presentation of baseline information for the period before the implementation of physician payment reform, focusing on beneficiary use of services. The first of these baseline analyses provides data on use of physicians services by a 5 percent sample of Medicare beneficiaries for the period 1986-90, using the same categorization to group beneficiaries and services used in the beneficiary monitoring system. Analysis of these data demonstrate that there were varying trends over the baseline period in the use of different types of services, with some showing relatively constant use over time, some rising rapidly, and others declining. Analysis of utilization by demographic subgroup in the baseline period showed differences in the level of use by race for many services. A major purpose of the monitoring system will be to observe whether the baseline trends changed or whether the relative differences in the level of use across demographic groups altered after the fee schedule was implemented.

The second of these baseline analyses is devoted to presenting information about trends during the same period, 1986-90, in the rate of hospitalization for selected medical conditions and procedures. Analyses of trends in hospitalization are expected to enhance our understanding of access to physicians services. For some medical enhance our understanding of access to physicians services. For some medical conditions, such as diabetic ketoacidosis or asthma or hypertension, admission to a hospital may be an indicator of lack of access to physician care or improper management in the outpatient setting. At the same time, admission to a hospital to perform certain procedures, such as hip replacement or coronary revascularization, may be an indicator of access to both primary and specialty physicians' services. This report discusses the criteria used to select the particular medical conditions and procedures for monitoring hospitalization rates, as well as the types of analyses that will be performed. Detailed trend data are provided by beneficiary group for 10 medical conditions and procedures to illustrate the capabilities of this effort to monitor changes that may occur in hospitalization rates after the implementation of the Medicare fee schedule.

This report also presents baseline data developed from the National Health Interview Survey (NHIS), using data from the 1984, 1986, and 1989 surveys. Survey data are being used to monitor access and utilization because they contain information not available in the Medicare data system, such as health status, insurance status, and income level. In addition, the NHIS contain data on the general population under age 65, which can be used to compare with data about the elderly. These baseline data indicate that health status and health insurance coverage have been important influences on use of physicians' services, for both the younger and older population groups.

OBRA 1989 requires the Secretary of the Department of Health and Human Services to include as part of this annual Medicare physician payment report recommendations:

(i) addressing any identified patterns of inappropriate utilization,
(ii) on utilization review,
(iii) on physician education or patient education,
(iv) addressing any problem of beneficiary access to care made evident by the monitoring process, and
(v) on such matters as the Secretary deems appropriate.

The final chapter of this report discusses the Department's actions regarding each of these issues. It summarizes the efforts underway in the Agency for Health Care Policy and Research in the Department of Health and Human Services, to enhance the quality, appropriateness, and effectiveness of health care services through the Medical Treatment and Effectiveness Program (MEDTEP). MEDTEP is a major program with four components: research projects relating to understanding patient outcomes; the development of clinical practice guidelines, medical review criteria, standards of quality, and performance measures; the development of data bases to support effectiveness research; and the dissemination of research findings and practice guidelines. HCFA will utilize the findings from all these activities to help identify and address patterns of inappropriate use, especially through the peer review organization (PRO) system.

This report also discusses HCFA's efforts to advance the efficiency and effectiveness of PRO review through the development of the uniform clinical data set (UCDS). The UCDS will identify cases to undergo utilization review and it will provide baseline data for tracking appropriateness of care. In certain areas, heart disease in particular, major efforts will be made through the PRO system to improve appropriateness of care.

The report concludes with a discussion of the new Medicare Current Beneficiary Survey and the types of information it can provide in future monitoring efforts required by this statute. HCFA has funded a number of extramural projects that are underway which, when completed, are also expected to provide information that will enhance the basic analytical approach and monitoring strategy discussed throughout this report. The report observes that despite the improvements in the flow of Medicare claims data into the NCH the analyses for the April 1993 report will have only limited data from the period after the fee schedule went into effect. Lag time will still exist between the time a service was rendered and the time the claim is submitted for payment. It is expected that when the next analyses are being prepared, Part B data from the monitoring system will be nearly complete for only the first two quarters of 1992. Developing an understanding of any changes in use and access will undoubtedly require data over several quarters of experience.

Chapter 1

Introduction to second annual report

BACKGROUND

This report is the second annual report under section 1848(g)(7) to the Social Security Act. This section requires the Secretary of the Department of Health and Human Services to monitor:

- (i) Changes in the utilization of and access to services furnished under this part within geographic, population, and service related categories.
- (ii) Possible sources of inappropriate utilization of services furnished under this part which contribute to the overall level of expenditures under this part.
- (iii) Factors underlying these changes and their interrelationships.

The Secretary is to study and report annually to Congress on changes in utilization and access and on "the factors (including factors relating to different services and specific categories and groups of services and geographic and demographic variations in utilization) which may contribute to such changes."

The legislative context makes clear that the purpose of the report is to monitor the impact on utilization, access and appropriateness of the changes in Medicare physician payment mandated by OBRA 1989. These are the most significant changes in the way Medicare pays physicians since Medicare began. There have been three major changes. First, Medicare's current charge-based system is being replaced by a nationwide resource-based fee schedule during a 1992 to 1995 transition period. Fees will vary across geographic areas only to reflect geographic differences in practice costs. Specialty differences in payments have been eliminated. Additionally, the Health Care Financing Administration (HCFA) is making efforts to eliminate, as far as possible, variations across areas in how services are defined and coded. The use of local codes to define procedures is being eliminated. There are now standard definitions of what is included under global fees. Second, continuing a process that began in 1987 with the Maximum Allowable Actual Charge (MAAC) limits, restrictions are being placed on physicians' actual charges so that enrollees' liability for balance billing on unassigned claims will be no more than 15 percent of the nonparticipating fee schedule amounts by 1993. Moreover, Medicare will pay a 10 percent bonus to physicians practicing in health manpower shortage areas.

Third, the law mandated target rates of growth, or Medicare volume performance standards (MVPS), for Medicare spending for physician services. The MVPS are to be set by Congress or, if Congress does not set a target, by a formula prescribed in the law. If the growth in physician expenditures exceeds the target, then the percentage increase in physician fees will be reduced. MVPS have been in effect since 1990.

The 1991 report to Congress discussed possible analytical strategies and data bases that could be used to monitor utilization and access. The current report describes the two basic strategies put in place to implement the Secretary's charge. First is the development of an initiative in HCFA to capitalize on the potential of Medicare's new National Claims History (NCH) system to provide up-to-date information for monitoring physicians' services as physician payment reform goes into effect. Second is the development of baseline data for the period preceding physician payment reform and the indicators that are being used to monitor changes in utilization and access under physician payment reform.

It is important to keep in mind that many changes were made in the way Medicare paid physicians before the OBRA 1989 payment reform was instituted. Payment reform should be viewed as part of a continuum of changes in Medicare payment policy. Thus, in making comparisons of utilization and access in the post-payment reform period with the pre period, it should be recognized that the post period is being compared with a period in which there were also many changes. Some of the major changes occurring before payment reform include the institution in 1975 of the Medicare Economic Index as a limit on increases in prevailing charges; the participating physician program begun in 1984, which provided incentives for physicians to accept assignment and different increases in prevailing charges for participating and non-participating physicians; the MAAC provisions in 1987 which put limits on what non-participating physicians could charge; reductions in prevailing charges for overpriced procedures instituted for one group of procedures in 1988 and for another in 1990, and the institution of a fee schedule for radiology in 1989 and anesthesiology in 1990.

These changes may make it difficult to attribute differences in utilization in the post payment reform period to the impact of payment reform, rather than to the continuing effects of measures instituted earlier. Moreover, changes in the health delivery system unrelated to payment reform, such as the introduction of new technologies, will continue to affect utilization. Other activities in the post-reform period may also affect utilization trends. Such activities include the efforts of the Peer Review Organizations which review the necessity and appropriateness of care. In addition, the Agency for Health Care Policy and Research has implemented a major program to develop and disseminate scientifically-based standards for appropriate care.

Defining and measuring access

Despite the widespread use of the term "access" in health care policy and research discussions, there is no uniform definition of the term nor is there uniformity in the way it is measured (Penchansky and Thomas, 1981; Yergan et al., 1981). Ultimately, the goal in measuring access is to reflect whether or not an individual is able to obtain care when desired or when needed. Access has been defined as "a general concept that summarizes a set of more specific dimensions describing the fit between the patient and the health care system" (Penchansky and Thomas) and as "the absence of barriers to receiving care" (Bernardin and Schoenman). For the purpose of this report access will be viewed primarily as "...those dimensions which describe the potential and actual entry of a given population group to the health care delivery system" (Aday, Fleming, Andersen).

There are many measures of access. They are generally grouped into measures of potential access and of realized access (Aday, Fleming, Andersen; Bernardin and Schoenman). Potential access refers to the structural features of the medical care system and to various individual characteristics that influence whether people obtain care. For the Medicare population, they include such system characteristics as physician to population ratios, overall and by specialty, and the percentage of physicians participating in Medicare and such individual characteristics as other insurance coverage, travel time, waiting time, income, wealth, health status and having a regular source of care. HCFA's Medicare Current Beneficiary Survey (MCBS) will provide a number of individual-based measures of potential access. HCFA is also developing data to monitor physician supply, by specialty and by participation rates.

Commonly used measures of realized access include utilization rates for physician and for other services, and by specialty and type of service. In this report, access is principally measured by utilization. When using utilization to measure access it is important to control for need by using population based measures of health status. Differences in access among subgroups may be appropriate if they reflect differences in need for services. On the other hand, two groups with the same level of use may not have equal access if the need for care in one group is much greater. Need for care may be measured using survey information on measures such as perceived health status, activity limitations, or functional status. Such survey measures have been shown to be related to the use of services and are widely accepted and employed. They are good global indicators of the health of a population. However, they do have limitations. They do not measure the extent or severity of specific medical conditions in a population. It would be desirable to have pertinent data on the extent and severity of specific diseases among the elderly on a population basis to examine access, but such data do not exist. (Several surveys gather data on the presence of certain chronic conditions, but the sample sizes are generally too small for detailed analyses.)

The lack of health status information in administrative data is another limitation when analyzing use rates. Since this and future reports will concentrate on monitoring trends in use, rather than on levels of use among groups, it is not as serious as it might be. If use of a particular service declines in one group relative to another, it is probably not due to a change in health status for that group. For example, it has been noted that the rates of many surgical procedures (such as coronary artery bypass grafts) are lower for black persons compared to white persons. If the rate of such surgeries among black persons increases relative to white persons, improved access rather than worsening health status among black persons would be the most likely explanation. But it also should be kept in mind that clear causality between changes in use and changes in payment cannot be established solely by monitoring claims data.

For this report, survey based measures from the National Health Interview Survey (NHIS) will be employed to control for need. Future reports will incorporate measures from the MCBS. In addition, a grant to the Center for Health Economic Research (CHER) will begin to explore measuring access on an episode basis by examining the use of services for patients hospitalized for selected conditions and procedures. The CHER research will be an important extension of the use of administrative data but it will be patient, not population, based.

Other measures of realized access include the use of preventive care, patient satisfaction with care and whether people report being able to obtain services when they think they need them. Since there are often well accepted norms for the use of preventive services (e.g., mammograms, pap smears), it is not always necessary to control for need when comparing use among subgroups. This report will use Medicare data to examine trends in rates of preventive services such as mammograms and pap smears. Information on patient satisfaction and on reasons for not obtaining care that a person believes he or she needs will be available from the MCBS.

POTENTIAL IMPACTS OF PHYSICIAN PAYMENT REFORM

The impact of physician payment reform on Medicare payments to physicians will vary by physician specialty and locality. Generally, physicians in urban areas and in surgical specialties will have fees reduced relative to rural physicians and medical specialties. However, there will be many exceptions to these patterns because of the variation in current payment levels among individual physicians as well as among urban and rural areas.

The impact of physician payment reform on beneficiaries is difficult to anticipate. The effect of physician payment reform on the amount of care physicians provide to Medicare beneficiaries will be the result of changes in the demand for services by enrollees and in the supply of services by physicians. The demand for services may be affected by changes in out-of-pocket costs related to the balance billing provisions. The demand may also be affected by changes in coinsurance due to changes in Medicare payments and/or changes in Medigap coverage. As physician payment reform raises or lowers payments for certain services, the 20 percent coinsurance for those services will also be raised or lowered. In addition, Medigap policies might begin to cover the difference between actual charges and the Medicare fee on unassigned claims since balance billing will be limited to 15 percent of Medicare's fee. This could increase the demand for physician services. There also will continue to be other forces besides those of Medicare payment reform that influence the supply and demand for physician services to Medicare beneficiaries.

Physicians could respond in different ways to price changes. They could try to increase the volume of procedures whose prices have been cut or they could try to increase the volume of other procedures. Physicians might restrict care for Medicare patients in favor of higher paying patients (Congressional Budget Office, 1990). Price shifts could also have an impact on geographic differences in access, particularly if increases in prices make rural areas more attractive as practice sites for physicians.

The extent to which physicians actively pursue collection of Medicare deductible and coinsurance amounts may also change. Also, changes in billing rules for global surgery could increase the number of consultations billed separately. In some cases, consultations included in a global fee may now be billed separately.

ANALYTICAL STRATEGY

The overall analytical approach to monitoring access and utilization during the implementation of payment reform will be to examine Medicare claims data to compare trends before and after its implementation. In addition, using national survey data, trends in use and access to physicians services for the aged will be compared with trends for the population under age 65.

Because data for this report came from several sources, different years in the pre reform period have been used in different chapters. Medicare administrative data for 1986-90 will be used to track physician and hospital use in Chapters 4 and 5. Chapter 3 presents illustrative physician-based analyses. In the pre-payment reform period physicians were generally not uniquely identified, and data for this analysis came from a special four State data base covering 1987 and 1988 that uniquely identified physicians. The NHIS data in Chapter 6 were limited to 1984, 1986 and 1989, years that included a supplement on health insurance coverage.

Whenever possible, the analyses examine vulnerable groups who can be identified from the data, for which access could be a concern. These groups include black beneficiaries, the poor, the very old, Medicare enrollees without supplemental coverage, rural residents, and enrollees in poor health. Trends for these groups will be closely monitored and compared with other groups to detect possible changes in access.

For this report, physician service use rates for enrollees living in metropolitan statistical areas (MSAs) will be compared with use rates for those outside MSAs. For future reports, the Human Resource Profile County Codes, developed by the Office of Management and Budget, will be used to more finely classify areas. That system classifies urban counties into four groups and rural counties into six groups according to population size and adjacency to MSAs. This should improve our ability to analyze trends in access along urban-rural dimensions. Future reports will also categorize geographic areas and procedure groups by post-physician payment reform price changes and will analyze utilization and access for those areas and procedures with the greatest price changes.

In addition to analyzing access to Part B services, our analytical approach includes monitoring hospitalizations for certain procedures and sentinel events. The hospitalization data can complement the Part B data; changes in trends may help highlight areas where further study is needed.

OVERVIEW

Chapter 2 describes HCFA's development of a system to monitor trends in Part B physician services beginning with 1992 services and based on 100 percent Part B claims submitted for payment. The Part B monitoring system is based on the NCH, the new Medicare administrative data system, which has the potential for providing more accurate, detailed and timely data than available previously. This chapter also illustrates the type of information that the monitoring system will produce.

Chapter 3 describes HCFA's strategy for monitoring Part B physicians' services from the perspective of the physician. It also provides illustrations of the types of analyses that can be undertaken using the NCH.

For example, currently there is concern that some physicians have begun to limit the number of Medicare patients in their practices or to refuse to take new patients. The monitoring of physicians' practice characteristics will provide some information on the extent to which this may be occurring under physician payment reform. Also, the Medicare Current Beneficiary Survey will be able to provide information about patients' access to services.

Chapter 4 covers baseline trends in payments for Medicare Part B physicians' services from 1986 to 1990. The thousands of HCFA Common Procedure Coding System

(HCPCS) codes were grouped into meaningful aggregations to allow trends in categories of service to be tracked. The data source for this analysis is the 5 percent Part B Medicare Annual Data (BMAD) beneficiary file. Future reports will continue the analysis of Part B services using 100 percent data from the NCH files.

Chapter 5 covers baseline trends in hospitalization rates for selected medical conditions and procedures from 1986 to 1990. For some conditions, changes in trends for admission to a hospital may be an indicator of access to care and of the adequacy of medical management in the outpatient setting. For other conditions or surgical procedures, changes in trends for admission to a hospital may also be an indicator of access to physicians, usually specialists who provide highly technical services. Moreover, it is important to monitor hospital use because of the possible effects of system-wide changes, including changes not related to Medicare physician payment reform. Observed changes in patterns of hospital use may raise important questions for further study.

The data source for this chapter is the Medicare Provider Analysis and Review (MEDPAR) file, which contains information on 100 percent of hospital stays for Medicare enrollees, including procedure and diagnosis codes. For the baseline period, MEDPAR had some advantages over BMAD for tracking inpatient procedures. It contains data on all hospital stays while BMAD covers only a 5 percent sample of physician claims. MEDPAR does not suffer from some of the problems of data completeness which were present in BMAD in its early, developmental years.

Chapter 6 examines use and access to physician services with data from the NHIS of the National Center for Health Statistics. Data for 1984, 1986 and 1989 are analyzed. These survey data supplement the analyses of Medicare claims data in two major ways. First, they provide data on the population under age 65 for comparison with the 65 and over population. Second, they provide data to examine utilization by socio-demographic variables not available from the Medicare data system. This enables vulnerable groups to be identified on the basis of insurance coverage, health status and other dimensions.

As noted above, the Secretary is required to monitor changes in use and access to care under section 1848 of the Social Security Act, as well as inappropriate use which contributes to the overall level of expenditures. Physician payment reform was implemented, in part, from concerns about incentives in the payment system for inappropriate utilization, especially for highly technical services that had high fees relative to costs. Under the new payment system, some physicians face reduced fees and might attempt to recover losses by providing unnecessary services; other physicians face increased fees which also could create incentives for inappropriate use. However, there is a very limited scientific foundation for determining the appropriate rate of use for physician services.

To improve knowledge and consensus on what services are appropriate Congress created the Agency for Health Care Policy and Research in 1989 as the lead agency in the Department of Health and Human Services to enhance the quality, appropriateness, and effectiveness of services. The final chapter in this report summarizes the Agency's efforts to date, HCFA's efforts through the peer review organizations program to monitor quality and outcomes of care, and how these efforts will be used in making recommendations. Chapter 7 also summarizes work in progress. Appendices A-D contain more detailed information about the baseline data and explanatory material.

Chapter 2

Development of a monitoring system to track beneficiary access to Medicare Part B services

HCFA has been working to develop a monitoring system to produce timely information to evaluate use of and access to Medicare services, received on or after January 1, 1992. The capability of implementing a system to monitor physician payment reform stems from a fundamental redesign in the processing of Medicare claims. The new claims processing system will result in a far more complete, accurate, and timely flow of information into the administrative data system.

This chapter describes (1) the redesign of the flow of claims data into the administrative data system; (2) the development of a Part B beneficiary-based monitoring system to capture the claims data as they flow into the system and (3) plans to expand the monitoring of physician payment reform by tracking the use of services by beneficiaries in the MCBS sample. The chapter ends with examples of the type of data that will be available from the beneficiary-based monitoring system.

(1) The Redesign of the Flow of Medicare Claims Data

In recent years, HCFA implemented a fundamental change in the way Medicare claims are authorized and transmitted to the central office. Previously, providers sent claims to Medicare fiscal agents (intermediaries and carriers); the fiscal agents reviewed and paid the claims and sent records of payment to HCFA's central office for administrative purposes. For Part B services, payment records submitted for administrative purposes contained only summary information. That is, although the payment records reflected 100 percent of Part B payments, individual procedures or services reimbursed could not all be identified. To obtain more detailed information about each individual service provided, the beneficiary BMAD file was developed. This file contained all claims for a 5 percent sample of beneficiaries and was submitted once a year by each carrier. Both the 100 percent payment record system and the 5 percent BMAD beneficiary file have limitations in timeliness, completeness, data quality, and comparability across geographic areas.

Currently, claims processing and authorization have been reorganized into a system known as the common working file (CWF). Providers send claims to the fiscal agents, who process the claims and in turn send them to one of nine "host sites" in the United States. The host sites have the responsibility to review the claims, authorize payment, and provide daily records of payment to HCFA.

The flow of data from the new claims payment process has resulted in an unprecedented opportunity to generate timely data for program administration and evaluation. HCFA has taken advantage of the flow of information from the CWF to develop the monitoring system. The NCH has three important features: receipt and accrual of data on a weekly basis, ability to access 100 percent of all Part A and Part B claims for certain administrative and evaluation purposes, and organization of a historical data base in a way that maximizes the potential for information retrieval. The implementation of the CWF and NCH systems mean that much more timely and complete (rather than summarized) data are available to HCFA for monitoring physician payment reform. It is anticipated, moreover, that the NCH data will be more reliable and uniform across the U.S. than BMAD records because the data submitted through the nine host sites will have been reviewed and edited.

(2) A Beneficiary-Based Monitoring System

The beneficiary-based Part B monitoring system will use the NCH to produce quarterly data, beginning with services received in January 1992. The focus of the beneficiary-based monitoring system will be on measuring total changes in utilization for the Medicare population as well as for subgroups. A major strength of this system is that it will rely on 100 percent of the Part B data, at a time when it is available in the NCH.

Claims information reported in the NCH will first be aggregated into categories, by type of physician service, using a classification system developed jointly by researchers in the Office of Research and Demonstrations in HCFA and at the Urban Institute. The classification system groups the thousands of HCPCS codes into about 100 meaningful types of service. This classification system is described in Chapter 4. The groupings specified for the monitoring system are the same ones used in Chapter 4 to facilitate comparisons between the baseline period and the period following implementation of physician payment reform. The utilization measures to be monitored are allowed charges, number of services, and per capita rates, measures also used in Chapter 4.

In line with the overall analytic approach outlined in the Introduction and in Chapter 4, the emphasis of the Part B monitoring system will be on tracking use and access to services for vulnerable groups of the Medicare population and for beneficiaries living in areas most affected by physician payment reform fee changes. Use will be monitored by age, sex, and race for the aged, disabled and end stage renal disease (ESRD) beneficiary populations.

There will be a number of geographic groupings. States will be grouped into four categories according to the average fee change from 1991 to 1996 when physician payment reform will be fully phased in. In addition, data for Los Angeles County; Manhattan, New York; and Dade County, Florida will be shown separately because these three metropolitan areas are expected to show very large decreases in overall fee rates. Data will also be displayed using the Human Resource Profile Code groupings, which categorize metropolitan counties into four groups and non-metropolitan ones into six groups. A further geographic grouping will focus on provider information by Health

Professional Shortage Areas (HPSAs). Chapter 4 provides details about the geographic groupings. All the demographic and geographic categories in the monitoring system will be consistent with those used in the period before physician payment reform so that comparisons can be made.

The current plan is to produce data on a quarterly basis. For each calendar quarter of incurred services, the information accumulated will continue to be updated for four additional quarters. That is, for a full 12 months after the end of a quarter, data will be updated, thereby assuring virtually 97-100 percent completeness for each quarter when updating has ceased.

(3) Monitoring Physician Payment Reform with the Medicare Current Beneficiary Survey (MCBS)

We are exploring the possibility of incorporating the MCBS into the monitoring system. The MCBS would be used to identify certain vulnerable groups of the Medicare population that cannot be identified from Medicare enrollment or claims data. In particular, vulnerable groups from the MCBS can be defined in terms of income, health and functional status, perceived access, and insurance coverage. Part B utilization information for persons in the sample would be extracted from the NCH to link with information from the survey in order to monitor Part B use by vulnerable groups identified by the survey. Socio-demographic and health status information can be updated for as long as the cohort remains in the MCBS sample, which will be at least 2 years according to current plans. Medicare utilization for the cohort, however, can be tracked for as long as they are enrolled in Medicare. This monitoring activity will be subject to the limitation of the sample size.

Examples of Tracking Beneficiary Access from the Part B Monitoring System

As noted above, the Part B monitoring system accumulates information on a quarterly basis and began with services rendered on or after January 1, 1992. Because this section of the report is under preparation at a time when the monitoring system is only 2 months old (February 1992), no meaningful data can be produced to illustrate its utility. However, data from an earlier period were used to illustrate some of the types of analyses that will be available from the monitoring system.

To simulate the new quarterly monitoring system, 5 percent sample files for 1990 and 1991 were used to develop quarterly data. The 1990 file was the BMAD beneficiary file. This file had a "cut-off" date 3 months after the close of the calendar year. Although the data are estimated to be 95 percent complete for the year, analysis of the quarterly data show, as expected, a steady drop-off in completion from the first to the fourth quarter of the year, because of the time required for claims to flow into the system. The 1991 file, which was derived from NCH data, had a "cut-off" date of December 1991, resulting in even less completion overall and on a quarterly basis. Thus, these quarterly data for 1990 and 1991 cannot be used to show how the new Part B monitoring system can track changes in total utilization. However, these data can illustrate the monitoring of relative use for vulnerable groups of the population, if we can assume that the incompleteness of the data is likely to be consistent across subgroups. Geographic comparisons, however, might be more subject to variations with regard to completeness of the data. Thus, the data shown here are meant to be illustrative, rather than actual.

In this section, comparisons of use rates are presented for two services, physician office visits (initial and established combined) and endoscopies (all types)[1]. The comparisons reflect the ratio of the use rates for specific subgroups divided by the use rates for a reference group. All Medicare aged, disabled and ESRD beneficiaries are included in these tables. The subgroups include sex, race, age, and State estimated impact area groups. In each case the ratios are expressed by quarter for 1990 and 1991. Because the data for 1991 were truncated, no tests of statistical significance in trends were performed.

Figure 1 compares use rates of physician services between males and females. Males served as the reference. As with all reference groups, the ratio value for males was 1. Females averaged about 18 to 20 percent more physician visits per person than did males throughout this timeframe with no indication of a downward or upward trend (Figure 1). As shown in Figure 2, black persons averaged about 12 to 18 percent fewer office visits per person than did white persons (the reference groups). Although there was a slight downward trend in this ratio, the shortfall of 1991 data makes this conclusion premature at this time. Office visits by age group showed a more complicated pattern (Figure 3). Compared to persons ages 65-74, persons ages 44 and under, and persons 45-54, had 40 percent fewer and 20 percent fewer office visits, respectively. However, the lowest ratio of office visits is shown by persons ages 55-64, with fewer than one-half as many office visits per person as persons ages 64-74. The highest rate was for persons ages 75-84, while persons 85 and over have a rate comparable to that for persons ages 65-74. Figure 3 does not suggest a trend in relative use rates by age group.

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[1] The codes included in the office visit and endoscopy categories are as follows:

Office Visits (1) New: 90000-90020, 90757, 99201-99205, 99381-99387, 99432, (2) Established: M0005-M0008, 90030-90080, 90750-90755, 90760-90774, 95115-95117, 99058, 99211-99215, 99391-99429, 99438

Endoscopy (1) Arthroscopy: 29800-29898, (2) Upper G.I.: 43200-43245, 43247-43272, (3) Sigmoidoscopy: 45300-45337, (4) Colonoscopy: 44388-44393, 45355-45385, (5) Cystoscopy: 52000-52340, (6) Bronchoscopy: 31615-31651, 311659, (7) Laparoscopic Cholecystectomy: 49310-49311, (8) Laryngoscopy: 31505-31579, (9) Other: 23356, 27373-27379, 27436, 27851-27853, 31071, 31250-31285, 32700-32705, 39400, 43834, 44360-44386, 45386, 46600-46614, 47550-47556, 49300-49303, 50550-50580, 50951-50972, 52605, 52800-52805, 57450-57454, 58980-58996, 59150-59151, 74328-37340, 92511

Figure 4 shows the trends in physician office visit use by State impact area groups. The State impact areas were grouped based on the estimated impact of overall physician payment reform as published in the November 25, 1991, Federal Register Vol. 56(227). States were grouped according to the overall estimated change in prices by 1996 as follows: 1) increase (+4% to +12%); 2) no change (+ 2% to - 3%); 3) moderate decrease (- 4% to - 9%); and 4) large decrease (-10% to -20%).

States included in the group expected to have no change in price levels served as the reference group. The large decrease State group had the highest office visit rates during the 2 years preceding the implementation of the Medicare fee schedule, about 10 to 20 percent higher than the no change States. States with an estimated moderate decrease in prices had a use rate about 7 to 8 percent higher than the no change States. States expected to have an increase in prices were about 5 percent above the no change States. These patterns were fairly constant over the eight quarters of 1990 to 1991.

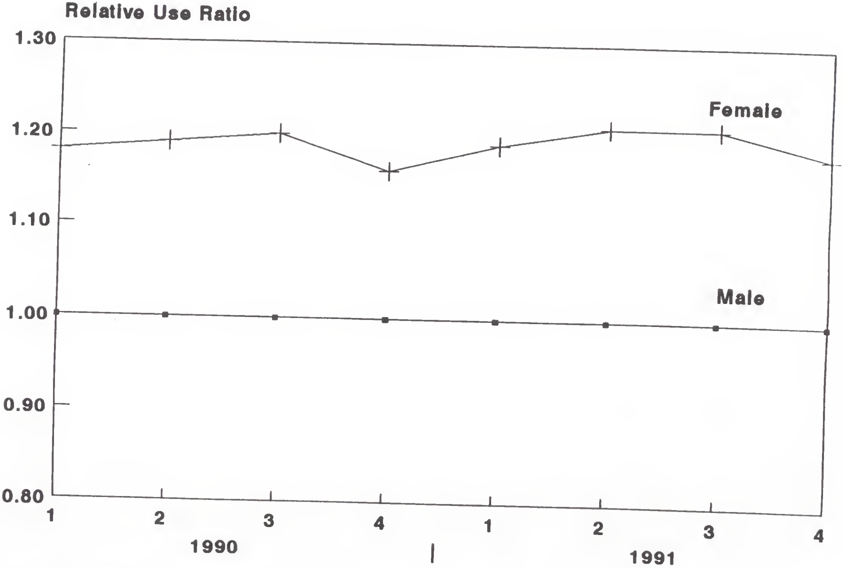
Trends in the relative use of endoscopies are shown in Figures 5 through 8. Whereas females had about 20 percent more office visits than males (Figure 1) they had about 20 to 25 percent fewer endoscopies than males (Figure 5). Black persons had about 20 to 25 percent fewer endoscopies than did white persons in most of the 8 quarters during 1990 and 1991 (Figure 6). There was no obvious trend. The effect of age on use patterns for endoscopy was similar to that for office visits. Use rates were lowest for persons ages 45 and under and for persons ages 55-64. The highest rates were for persons ages 75-84, and dropped considerably for persons 85 and over. Finally, endoscopy use rates by State impact groupings are shown in Figure 8. The lowest rates were in the no change States. The other three groups averaged between 7 and 20 percent higher use rates over the 2 year period.

This section illustrates the monitoring of use rates by quarter for the calendar years 1990 and 1991. The overall patterns of use are comparable to those shown in Chapter 4. Black persons tend to use fewer services than do white persons. Males and females differ in use patterns depending on the service and age effects tend to be mixed. Although no statistical tests were performed for the types of services examined, there seemed to be no overall trends in relative use rates.

The monitoring activities that can be accomplished with the beneficiary-based monitoring system will permit more detailed examination of various types of services. In addition, some adjustments can be made to the use rates to control for different age distributions for males and females and for whites and blacks. As the monitoring system begins to generate data for 1992 services, analyses will include the assessment of changes in total utilization as well as for vulnerable population groups.

Figure 1

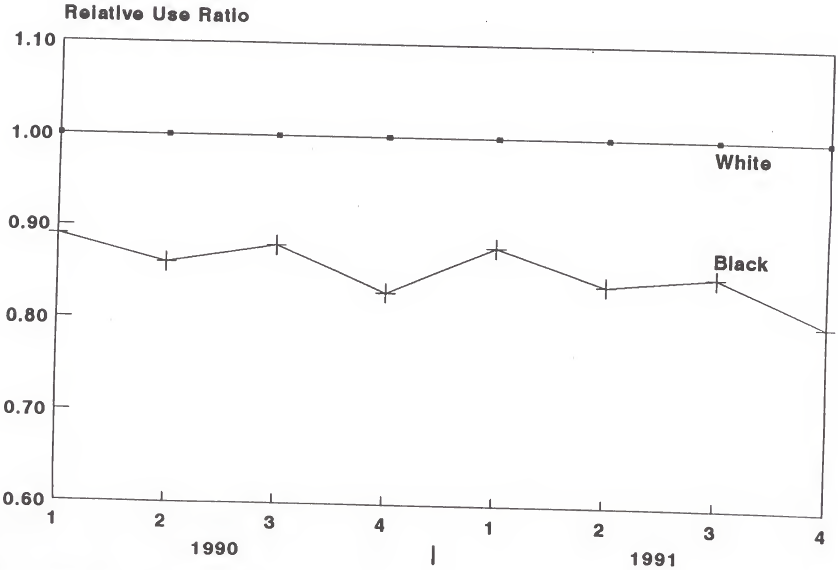
Illustration of Monitoring of Medicare Part B Services Under Physician Payment Reform: Office Visits Services per Person, by Quarter: 1990-91, by Sex



Sources: 1990 BMAD and 1991 NCH

Figure 2

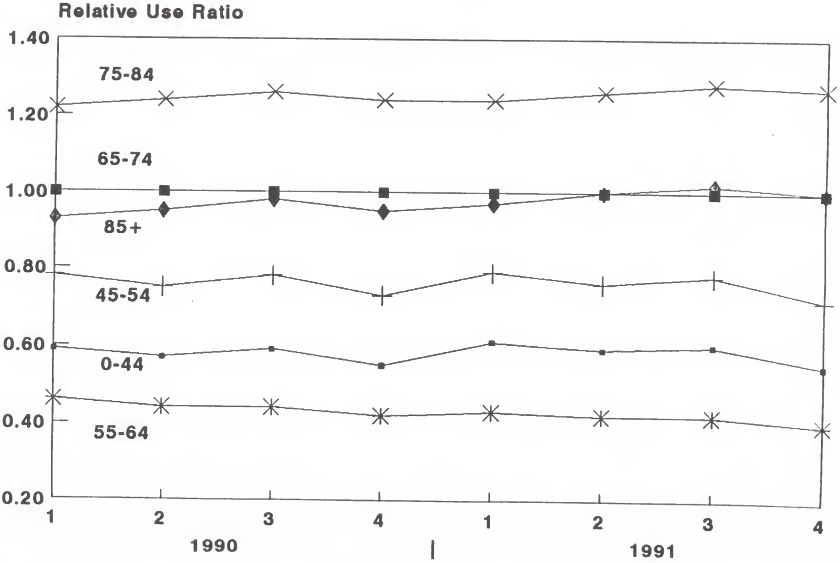
Illustration of Monitoring of Medicare Part B Services Under Physician Payment Reform: Office Visits Services per Person, by Quarter: 1990-91, by Race



Sources: 1990 BMAD and 1991 NCH

Figure 3

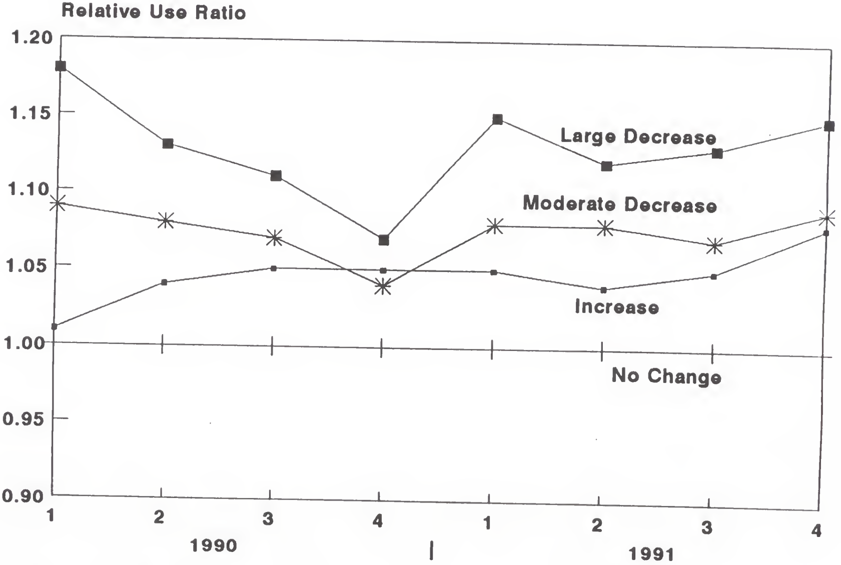
Illustration of Monitoring of Medicare Part B Services Under Physician Payment Reform: Office Visits Services per Person, by Quarter: 1990-91, by Age



Sources: 1990 BMAD and 1991 NCH

Figure 4

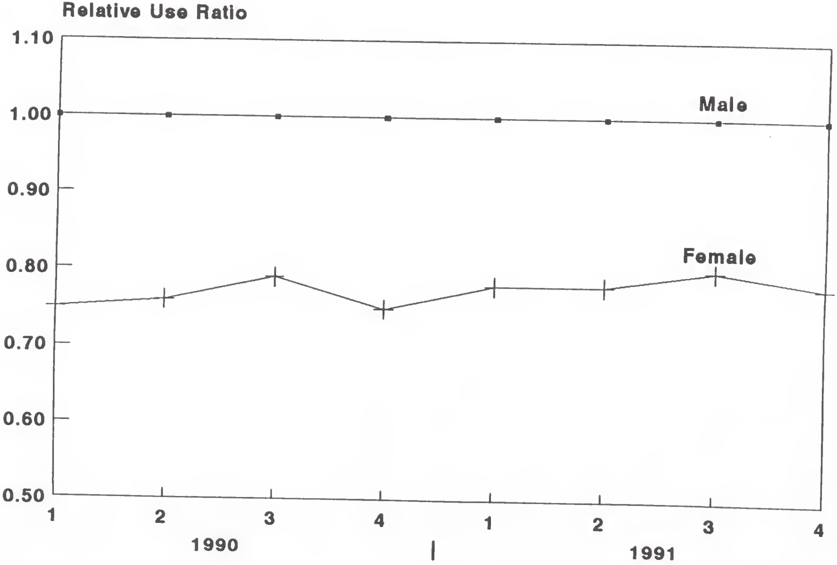
Illustration of Monitoring of Medicare Part B Services Under Physician Payment Reform: Office Visits Services per Persons, by Quarter: 1990-91, by State Impact



Sources: 1990 BMAD and 1991 NCH

Figure 5

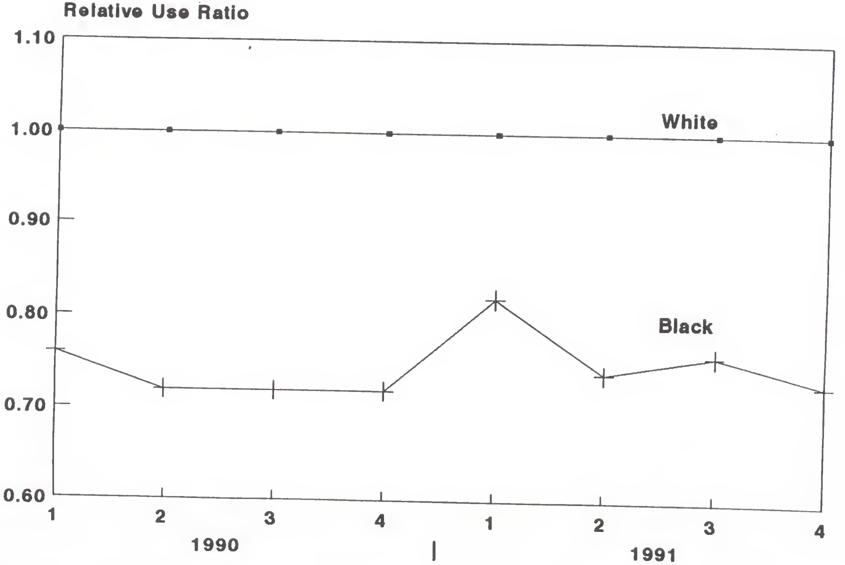
Illustration of Monitoring of Medicare Part B Services Under Physician Payment Reform: Endoscopy Services per Person, by Quarter: 1990-91, by Sex



Sources: 1990 BMAD and 1991 NCH

Figure 6

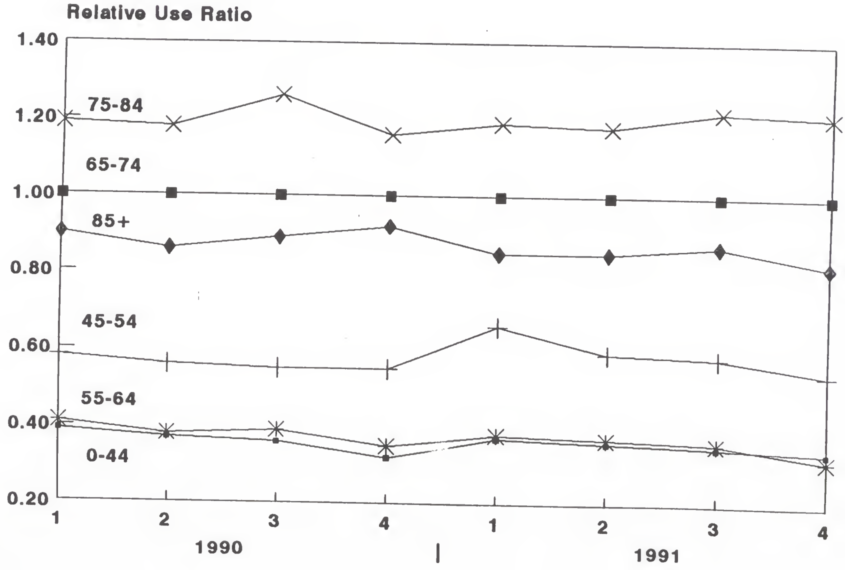
Illustration of Monitoring of Medicare Part B Services Under Physician Payment Reform: Endoscopy Services per Persons, by Quarter: 1990-91, by Race



Sources: 1990 BMAD and 1991 NCH

Figure 7

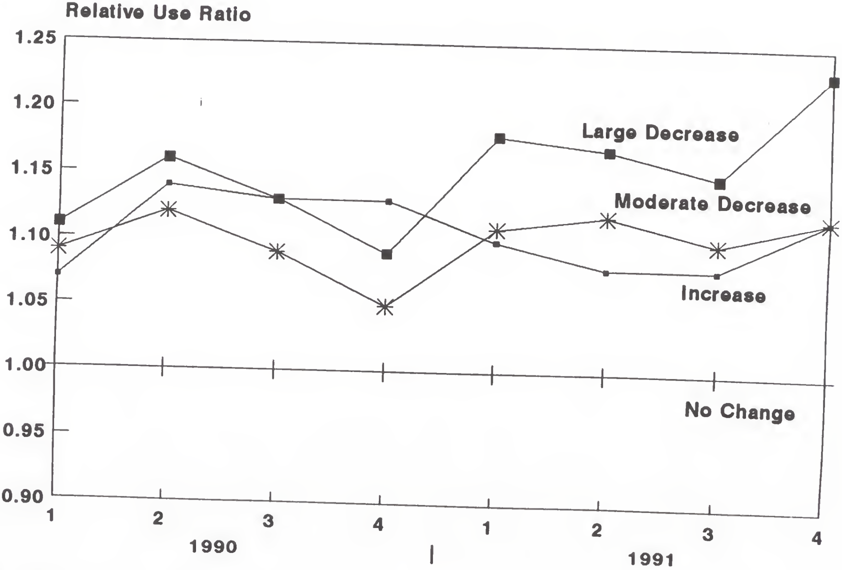
Illustration of Monitoring of Medicare Part B Services Under Physician Payment Reform: Endoscopy Services per Person, by Quarter: 1990-91, by Age



Sources: 1990 BMAD and 1991 NCH

Figure 8

Illustration of Monitoring of Medicare Part B Services Under Physician Payment Reform: Endoscopy Services per Person, by Quarter: 1990-91, by State Impact



Sources: 1990 BMAD and 1991 N

Chapter 3

Development of a monitoring system to track access to and utilization of Medicare services by physician practice characteristics

INTRODUCTION

The implementation of the Medicare fee schedule on January 1, 1992 altered the levels and relative prices for most Medicare services. Simulations released by HCFA with the Final Rule for the 1992 Medicare fee schedule suggest that national average payment changes will range from +10 percent to -15 percent during the first year of implementation of the fee schedule. In addition, there are new statutory limits on actual charges which affect prices physicians receive for services to Medicare beneficiaries. These payment changes could lead to changes in the utilization of and access to physician services.

Physicians might respond to the fee schedule and the limiting charges in a variety of ways that can be monitored by Medicare claims data: (1) changing the number and types of Medicare beneficiaries which they treat; (2) changing the supply or mix of services which they provide; and (3) changing participation status and the number of claims accepted on assignment. Physicians whose payments fall may respond by increasing the number of Medicare beneficiaries they treat or by altering the mix or the number of services which they provide to Medicare beneficiaries. On the other hand, some of these same physicians might respond by not treating any Medicare beneficiaries or by reducing the number of beneficiaries they treat or the number of Medicare services which they provide. Finally, it is likely that some physicians will not change their practices for delivering care to Medicare beneficiaries merely because of payment changes.

Some beneficiaries may respond to the fee schedule and the limiting charges by changing their demand for services. Surgical procedures whose prices are likely to fall under the fee schedule may become more affordable to beneficiaries, especially for those who do not have supplemental insurance, while office visits may become relatively more expensive as prices rise for these services.

In addition, changes in the health care delivery system unrelated to payment reform, including changes in medical technology and the rate of diffusion of new technology, may affect measures of utilization of services in the aggregate or at the individual service level. Thus, it may be difficult to separate out the effects of the physician payment legislation from other factors.

Further, changes in Medicare utilization rates may not tell a complete story. If beneficiaries increase their demand for services and there is an adequate supply of physicians to provide the demanded services, then one would expect utilization rates to increase. If on the other hand there is not an adequate supply of physicians to meet the increased demand, then utilization rates are likely to remain constant or fall and an access problem may exist. Thus, measures of physician supply and level of participation in the Medicare program could provide a more complete picture of use of and access to physician services.

We are designing a Physician Monitoring System to serve as a complement to the beneficiary-based monitoring system described in Chapter 2 and to provide measures of physician supply and level of financial participation in the Medicare program as well as measures of utilization of services. All analyses are performed at the physician level whereby the physician is the unit of observation.

Two data files comprise the Physician Monitoring System. The first file is the National Claims History Physician/Supplier Procedure Summary (NCH/PSP) file which summarizes 100 percent claims data for analysis by procedure code at the specialty and Medicare pricing locality level based upon the place where the service was rendered. The second file is the National Claims History Physician File (NCH/PF) which contains all claims for a sample of physicians who bill Medicare services and will allow for physician practice level analyses.

The NCH/PSP file will be used to monitor any changes that occur within various categories of physicians in several geographic areas and places of service in those areas. Analyses of the NCH/PSP file provides a means for examining changes over time in aggregate utilization of services. The monitoring system will permit HCFA to examine important details about significant changes in expenditures of physician services or in the level of financial participation in the Medicare program by physicians in different geographic areas or specialty designations.

To monitor access to and utilization of services from the physician practice perspective, the availability of physicians who treat Medicare beneficiaries and physician Medicare practice characteristics can be analyzed over time using the NCH/PF. Important physician supply questions can be addressed, including whether the number of physicians providing services to Medicare beneficiaries change over time, and whether the number of physicians performing particular services change coincident with relative price changes.

Three characteristics of a physician's Medicare practice that can be analyzed to monitor the level of participation in the Medicare program are: (1) the number and types of beneficiaries a physician treats; (2) Medicare revenue; and (3) the volume and types of services provided by physicians. Analysis of these practice characteristics would be designed to answer two important questions: (1) does the quantity and types of beneficiaries physicians treat vary across time or with the degree of price change; and (2) does the quantity and types of services provided by physicians change when prices are altered.

NATIONAL CLAIMS HISTORY PHYSICIAN/SUPPLIER PROCEDURE (PSP) FILE

The NCH/PSP file uses information from 100 percent of Medicare services and assembles the data for analysis by procedure code at the specialty and locality level based upon the place where the service was rendered. This NCH/PSP file may be used to monitor what services were produced and paid, where, when and by what kind of physician or supplier.

The file has the capability of generating details for particular procedures or groupings of procedures, physician/supplier specialty, and place of service. The details available for each procedure includes submitted charges, allowed charges, denied charges, and frequency of allowed and denied services. It is updated and reproduced each quarter.

The NCH/PSP contains data on payments for various categories of physicians in different geographic areas and different places of service. It presents what services were provided to Medicare beneficiaries by physicians and suppliers in each area. Recipients of the care include both area residents and out-of-area residents. The extent to which beneficiaries obtain care within or outside of the area in which they reside is a subject for separate study rather than part of the monitoring system HCFA has established.[1] Further, the cost and use of specific services by Medicare health maintenance organization enrollees are not included in the NCH/PSP. It is also likely that some physician and supplier services for Medicare enrollees whose primary insurance is an employer group plan are not reported to HCFA.

Table 1 is an example of the information being assembled in this file. It presents preliminary allowed charges incurred in the United States in 1991, by quarter, by physician/supplier specialty and recorded as of January 1992. As shown, the data for services furnished later in the year are less complete. The specialties shown are the same ones for which estimates of the effects of the Medicare fee schedule were provided with the November 25, 1991 Final Rule.

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[1] Several exploratory HCFA-funded studies have been performed and provide some insight on the magnitude of this issue. For example, see "Factors Affecting Interstate Utilization of Inpatient Care by Medicare Beneficiaries" (William Buczko, 1992, in print), "Geographic Border Crossing: Implications For Volume Performance Standards" (John Holahan and Steve Zuckerman, September 1991, NTIS Accession Number PB92-12586), and "Physician Studies: Growth in Physician Services" (Nelda McCall, Sande Kiriluk and Gordon Trapnell, 1990, Contract Number HCFA-500-89-0053-2).

TABLE 1
Medicare 1991 Allowed Charges for 25 Selected Specialties: All U.S. Areas by Calendar Quarter
(preliminary in millions of dollars)

	Jan. to March	April to June	July to August	Oct. to September
ALL PHYSICIANS	$8,415.0	$8,780.7	$8,272.9	$5,432.0
Family Practice	437.4	439.6	410.2	281.7
General Practice	302.7	299.1	273.9	177.2
Cardiology	703.8	724.0	662.7	418.8
Dermatology	145.9	168.9	170.1	122.8
Internal Medicine	1,440.1	1,454.4	1,344.3	886.9
Gastroenterology	219.6	231.8	216.6	141.2
Nephrology	114.4	111.7	105.5	54.1
Neurology	116.7	120.0	113.0	69.0
Psychiatry	148.5	154.2	148.9	76.5
Pulmonary	150.2	143.7	128.7	81.7
Urology	309.2	321.6	319.3	225.5
Radiology	730.7	770.2	732.6	441.8
Anesthesiology	309.9	321.7	306.0	178.2
Pathology	110.9	116.1	112.0	63.8
General Surgery	518.7	529.3	497.2	278.0
Neurosurgery	72.2	74.7	71.2	36.3
Ophthalmology	890.3	1,002.6	947.8	765.7
Orthopedic Surgery	412.0	424.4	400.1	246.7
Otolaryngology	94.2	98.8	94.3	63.3
Plastic Surgery	41.5	43.3	43.7	22.3
Thoracic Surgery	240.7	248.6	226.0	127.6
Clinics	342.6	373.7	385.1	240.2
Optometry	50.8	55.2	50.0	33.9
Chiropractic	43.6	48.4	43.8	22.3
Podiatry	162.6	178.6	167.2	109.3

Source: 1991 Medicare National Claims History Repository
Notes: Services performed during calendar 1991 that were recorded as of 1/1992.

The selected specialties and clinics presented in the table account for about 96 percent of national total Medicare allowed charges for physician services. Five specialties account for over half of the total: internal medicine, 17 percent; ophthalmology, 11 percent; radiology, 9 percent; cardiology, 8 percent; and general surgery, 6 percent. When data on 1991 have been fully reported, they may be used as a basis for tracking the changes in the distribution of Medicare payments among specialties and geographic areas that occur under the Medicare fee schedule system. However, 1991 may not be a suitable base because of the new balance billing limits.

NATIONAL CLAIMS HISTORY PHYSICIAN FILE

As noted earlier, two files, the NCH/PSP file and the NCH/PF will be used to monitor Physician Payment Reform from the physician perspective. The following section provides examples of how the NCH/PF can be used to monitor changes in access and use of Medicare services from the physician practice perspective.

The NCH/PF contains all claims for a sample of physicians who provide Medicare services. The NCH/PF will be annual files starting in 1992 and will allow for national as well as State-level analyses at the physician level. The Physician File will be updated on a quarterly basis to allow for prompt monitoring. It is important to note that billing time lags will result in an underestimate of services and allowed charges in the NCH/PF and the NCH/PSP. Thus, one must allow several quarters to elapse prior to using them for aggregate estimates of expenditures and total number of services.

Although HCFA has produced annual 5 percent sample Part B Provider Physician files since 1985, it has not been possible to uniquely identify individual physicians because of carrier-specific differences in assigning physician identification numbers. In earlier files, physicians practicing in multiple practice settings or physicians with more than one designated specialty were often assigned multiple provider numbers, while all physicians practicing in a single-specialty group practice or a clinic were often assigned one provider number which was used by all physicians in the group.

In 1989, HCFA implemented a national Medicare Physician Identification and Eligibility System (MPIES) registry, a system that uniquely identifies physicians who provide services to Medicare beneficiaries. This data base is designed to link all Medicare carrier provider numbers with a unique physician identifier number (UPIN). Thus, physicians who have multiple carrier provider numbers for payment purposes will have only one UPIN which allows for aggregation of all physician claims under one number. Furthermore, Medicare claims for physicians in groups must be uniquely identifiable.

The use of the UPIN has numerous advantages over the use of the provider number. Previously, the use of the provider number resulted in an overestimate of the number of physicians when one doctor had multiple provider numbers, and an underestimate of the number of physicians when large group practices billed under one provider number. Now accurate counts may be obtained on the number and types of physicians who are billing Medicare.

In addition, it is possible to study the quantity and types of Medicare services that particular physicians are providing as well as types of services by physician characteristics such as specialty and location. Analyses also may be performed on patterns in the types and numbers of beneficiaries that physicians are treating. Most importantly, changes over time in individual physician practices may be studied.

Although the MPIES registry has been in effect since 1989, HCFA did not require the UPIN to be placed on physician claims records until April 1991 and did not begin enforcement until January 1992. A review of claims reveals that there has been a lack of uniform usage of the UPIN across carriers and/or within carriers across time. Efforts have been made by HCFA to increase compliance. The lack of uniform UPIN usage may reduce the number of states which will be useable for all of 1992 for monitoring access and utilization from the physician perspective.

Since the development of the 1992 NCH/PF is not complete, it is not possible to provide data from these files for this report. However, we are able to provide examples of the types of physician-level analyses that can be performed to monitor access and utilization by providing descriptive analyses from a research project conducted in HCFA on the OBRA 1987 "overpriced" procedure price reductions. The data base used for this project is very similar in content and format to the NCH/PF, but is more limited in scope.

The analyses provided in this chapter are exploratory. Data were analyzed for only four States and for 2 years. In addition, the sample of physicians was predominantly solo-practitioners. Thus, the results are not generalizable to the nation nor are they generalizable to all physicians. Furthermore, it examines only 12 procedures (38 distinct services) having payment reductions. For many physicians, these procedures represent only a small portion of their Medicare practice. In contrast, the Medicare fee schedule and the new limits on actual charges will change payment levels for thousands of services which represent the majority of a physician's Medicare practice. Further, the "overpriced" procedure cuts occurring in the year studied are typically smaller than the price changes occurring as a result of the implementation of the Medicare fee schedule. Finally, these illustrative examples consider only Medicare payments and not changes in total revenue from Medicare beneficiaries such as those which result from balance-billing changes. Thus, one cannot expect to model the response to the Medicare fee schedule with these data.

ANALYTICAL FRAMEWORK

Reductions in selected Medicare prevailing charges preceding implementation of the Medicare fee schedule provide an opportunity to study changes in access and utilization following price changes. The OBRA 1987 "overpriced" procedure payment reductions are smaller than, but in some instances, approximate the price reductions some physicians face with the implementation of the Medicare fee schedule.

On April 1, 1988, Congress reduced the Medicare prevailing charge for 12 "overpriced" procedures: hip replacement, knee arthroplasty, knee arthroscopy, bronchoscopy, pacemaker insertion, coronary artery bypass graft (CABG), gastrointestinal (GI) endoscopy, transurethral resection of the prostate (TURP), suprapubic prostatectomy (SURP), dilation & curettage (D&C), carpal tunnel repair, and cataract extraction.

Prevailing charges were reduced by 2 percent and subject to further reductions on a sliding scale (3/13 of a percentage point for each percent that the 1987 prevailing charge exceeded 85 percent of the weighted national average of all prevailing charges for the respective procedure up to a maximum of 150 percent of the national average prevailing charge). The reductions varied across physicians and Medicare pricing localities yielding nominal changes ranges from 0 to 17.5 percent. However, physicians who changed participation status, specialty designation or Medicare pricing area could have received a price increase for these 12 procedures between 1987 and 1988. Appendix A-1 displays the distribution of average prevailing charge reductions by "overpriced" procedure for each of the four States.

The primary data in this study were collected by two firms, H&K Research and Center for Health Economics Research, for HCFA-funded research projects. Physician claims were obtained directly from two Medicare carriers who service four States: Alabama, Arizona, Oklahoma and Oregon. Since the price reduction did not occur until April of 1988, only 9 months of claims data for each year are contained in the analytic files to reduce seasonality affects (April-December 1987 and April-December 1988). Combined, these four States contain approximately 6 percent of all Medicare beneficiaries and represent roughly 5 percent of total Medicare expenditures in 1987.

In order to allow for analyses at the individual physician level, UPINs were appended to the claims by H&K Research. Because of the retrospective assignment of UPINs to the claims, H&K Research was unable to uniquely identify group physicians with their claims for Arizona, Oklahoma and Oregon. For these three States, only solo practitioners are in the study population. In Alabama, physician claims from solo practice and group practice physicians are uniquely identifiable so both types of physicians are in the study population.

The study population contains 3,653 uniquely identified physicians who performed at least one of the "overpriced" procedures during either 1987 or 1988. In 1987, the AMA Masterfile reported approximately 15,930 non-federal, office-based, patient care physicians practiced in the four States. Thus, the sample contains roughly 23 percent of all active physicians in the four States. Characteristics of the sample physicians are displayed in Appendix A-2.

A review of the distribution of number of procedures across physicians reveals a wide variation in the number of "overpriced" procedures performed annually by the study physicians. For example, the average number of cataracts performed per physician is 96 and the range is from 7 to 200. In contrast, the average number of suprapubic prostatectomies is 2 and the range is from 1 to 3. Appendix A-3 displays the distribution of average number of procedures across physicians.

The claims data collected for this study are very similar to those being collected in the NCH/PF and contain detailed information on provided services including procedure code, allowed charges, reimbursement amounts including coinsurance and deductibles, site of service, date of service, and beneficiary and physician identifiers. The presence of the UPIN allows for linkage to the MPIES data base which contains physician characteristics such as board certification status, specialty, age and participation status in the Medicare Participating Physician/Supplier Program. Demographic data for beneficiaries who receive services from the sample physicians may also be appended to the claims. Examples include age, sex and race of the beneficiary as well as information as to whether the beneficiary's state of residence is paying his/her SMI premium or whether the beneficiary is enrolled in a health maintenance organization. This level of detail allows for very flexible analyses which will be illustrated in the following section.

STATISTICAL ANALYSES

Comparisons of the physician practice were made between the two time periods with each physician acting as his/her own control. Two-tailed paired t-tests based on the t distribution for normally distributed data were used to determine statistical significance of changes in the physician's practice between 1987 and 1988. For small samples or for data that do not follow the normal distribution, Wilcoxon signed-rank tests were performed. Deviations from the mean values are expressed as standard errors.

RESULTS

Physician Availability

One important measure of access studied was whether physician availability changed coincident with price reductions for the 12 "overpriced" procedures. Figures 1 through 4 address the following access questions: (1) did the number of physicians providing services to Medicare beneficiaries change between 1987 and 1988; and (2) did the number of physicians performing "overpriced" procedures change coincident with the level of the fee reduction.[2]

Figure 1 displays the number of solo physicians per 1,000 Medicare beneficiaries who provided at least one "overpriced" procedure in either 1987 or 1988. The rate varies across the four States ranging from 26.3 solo-practitioners/1,000 beneficiaries in Alabama to 34.4 in Oklahoma. Between 1987 and 1988, the rate of solo-practice physicians per 1,000 beneficiaries increased 2.5 percent from 27.6 physicians/1,000 beneficiaries to 28.5 physicians/1,000 beneficiaries for the four States. Alabama and Oklahoma showed increases in the rates of physicians performing "overpriced" procedures, 3.3 percent and 9.4 percent, respectively; while Oregon declined 0.4 percent and Arizona declined 3.7 percent.

Figure 2 displays the number of sample physicians within each of the Medicare pricing areas for each of the States. Pricing areas are designed to reflect economically distinct geographic areas within each carrier's jurisdiction. Although there is considerable variation in the number of physicians providing "overpriced" procedures across the pricing areas within each State, there was virtually no change between 1987 and 1988. This suggests that physician practice settings are relatively stable between 2 years.

To address the issue of whether the number of physicians performing "overpriced" procedures changed following a price reduction, the number of physicians who performed at least one "overpriced" procedure in either year is analyzed by procedure. Figure 3 displays the data for the four States combined; while Figure 4 displays the data by State.

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[2] Figure 1 is restricted to only solo-practitioners. Thus, changes in physician availability may reflect a shift from solo-practice settings to group practice settings. The remaining analyses contain group-practitioners from Alabama; data for the other three States' contain only solo-practitioners. Furthermore, calculations of changes in the number of physicians as well as all other change calculations may be sensitive to the threshold definition used in selecting sample physicians, i.e., provided at least one "overpriced" procedure in either year.

The two figures reveal that there is wide variation in the rate of study physicians performing particular procedures, but that the rate of these physicians performing most of the "overpriced" procedures did not decline following the fee reductions. For example, in Figure 3, there were approximately 6 physicians per 1,000 beneficiaries who performed D&Cs, but less than 1 physician per 1,000 beneficiaries who performed a CABG.[3] For all but two of the 12 "overpriced" procedures, the rate of physicians performing the service remained the same or increased between 1987 and 1988 with increases ranging from 4.3 percent to 17.6 percent.

Suprapubic Prostatectomy was the only procedure for which there were substantially fewer physicians in 1988 than in 1987 performing the service. Although the 19 percent decline appears dramatic, this reduction is consistent with changes in the treatment of benign prostatic hypertrophy (BPH), the most common indication for a prostatectomy. Physicians are opting for the less invasive endoscopic techniques to treat BPH and reserving the suprapubic approach for patients with very large prostates (Boutwell, 1992).

Not only is there considerable variation across procedures, but also there is considerable variation in rates of the study physicians performing particular procedures across States as shown in Figure 4. In Oregon, for example, there were roughly 3.3 physicians per 1,000 beneficiaries performing D&Cs; while in Oklahoma there is nearly twice the rate, 6 physicians per 1,000 beneficiaries. A comparison of changes in the rates of physicians performing "overpriced" procedures across the four States reveals slightly different patterns. Oklahoma mirrored the four State picture, while Arizona experienced declines in the physician rates in seven of the 12 procedures. The variations across States and time may reflect, in part, differences in the propensity of physicians to participate in group practices versus solo practices.

In summary, physician availability as measured by number of physicians in the study treating Medicare beneficiaries or providing particular "overpriced" procedures appears to be fairly constant between 2 years. There is some variation in the number of physicians treating Medicare beneficiaries across States; however, even more variation exists when analyzing physician availability within State or across particular types of services. Although is it difficult to determine from these data whether access problems as measured by physician availability existed in 1987, it appears that physician availability did not change substantially between 1987 and 1988.

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[3] The low number of physicians performing CABGs is likely a function of the sample. Most of the physicians represented in the sample are solo-practitioners suggesting that most physicians who perform CABGs are members of group practices.

Physicians Medicare Practice Characteristics

Analyses of physician Medicare practice characteristics are designed to answer two important access and utilization questions: (1) do the quantity and types of beneficiaries physicians treat vary across time or with the degree of price change; and (2) do the quantity and types of services provided by physicians change when relative prices are altered.

Practice Characteristics: Medicare Caseload

The number and types of Medicare beneficiaries that physicians are treating may be a more valuable indicator of access than simply a count of the number of physicians who provided a service during a particular time period. Beneficiaries in areas with a large number of physicians who have moderately sized caseloads probably have considerable choice in the selection of a physician and may not face any particular barrier to receiving care. On the other hand, beneficiaries in areas with a comparable number of physicians of which only one or two appear to be treating large numbers of Medicare beneficiaries and the remaining physicians treating very few beneficiaries may face limited choice and barriers to receiving care.

Figures 5 through 8 provide estimates of physicians' Medicare caseloads by State, specialty and by price change categories. Figure 5 displays the distribution of the number of Medicare persons served per physician by State and year. Caseloads are presented for physicians at the 25th, 50th and 75th percentile. Beneficiaries could be counted more than once, if they received care from multiple physicians.

In 1987, the average caseload was 319 ± 6 beneficiaries per study physician for the four States combined. For each of the four States, there is roughly a twofold difference in the number of beneficiaries per physician practice across each of the three percentiles suggesting wide variation in Medicare practice size. In addition, Alabama displays markedly larger Medicare caseloads than the other three States in both years.

In 1988, the average caseload increased to 345 ± 6 beneficiaries per physician ($p<0.0001$). Of particular note is the consistent pattern of increasing Medicare caseloads across the study physicians at each percentile in 1988 relative to 1987. This finding suggests that not only did the average caseload increase in 1988, but there were increases in Medicare caseloads across the entire distribution of physicians. Paired t-tests of the differences in Medicare caseloads between 1987 and 1988 by State revealed statistically significant increases across all four States ($p<0.0001$). Appendix A-4 displays the paired t-test results.

Figure 6 displays the average study physician's Medicare caseload by the primary 1987 self-declared specialty of the physician.[4] Unlike the State-level analysis, there is considerably more variation across the specialties in average Medicare caseloads. The ophthalmologists and cardiologists have the largest Medicare caseloads followed by internal medicine, pulmonary diseases and urologists; while the obstetricians/ gynecologists have the lowest average caseload. As observed in the State-level analysis, the average Medicare caseload increased across most specialties in 1988, but in particular, for the two specialties cardiovascular medicine, 107 ± 23 beneficiaries ($p<0.0001$), and ophthalmology, 58 ± 6 beneficiaries ($p<0.0001$). Appendix A-5 displays the paired t-test results by 1987 specialty.

With the implementation of the fee schedule and new limiting charges, the level and direction of price changes will vary not only across geographic areas or specialty designation, but across physicians as well. One could hypothesize that physicians who face large price reductions would have a greater incentive to change the number of beneficiaries that they treat relative to physicians who face small or no price change. Given that physicians faced variable price changes with the "overpriced" procedure price reductions, an analysis is presented of the change in physicians' average caseloads by the degree of price change.

Each physician was assigned to a prevailing charge reduction class based upon the following assignment algorithm:

- NO CHANGE/INCREASE: Physicians whose prevailing charge was unaffected by the price cut or whose prevailing charge increased.
- SMALL DECREASE: Physicians whose prevailing charge reduction ranged from -0.0001 to -5.0000.

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[4] Specialties are self-declared in the Medicare program and were formerly used by carriers for differentiating payment amounts. Physicians may not select a specialty designation or they may select several specialties. Likewise, variation exists across carriers in the recognition and use of specialties. In addition, physicians may change their specialty designation between years. Thus, comparisons across carriers or across time at the specialty level are difficult. To reduce this confounding effect, specialty analyses are performed at the 4-State combined level and are not performed at the State level. Temporal analyses are performed using the 1987 self-declared specialty. Thus, changes across time at the specialty level do not represent changes in the number or types of physicians declaring themselves a particular specialty.

- MEDIUM DECREASE: Physicians whose prevailing charge reduction ranged from -5.0001 to -10.0000.
- LARGE DECREASE: Physicians whose prevailing charge reduction was larger than -10.0001.

Physicians who performed multiple procedures were assigned to a prevailing reduction class based upon the "overpriced" procedure which represented the largest share of his/her practice.

Figure 7 displays the average Medicare caseload for 1987 and 1988 by prevailing charge reduction class. Study physicians who faced no price change or experienced a small reduction had the largest average caseloads in 1987 and 1988, 360 and 364 beneficiaries, respectively. Study physicians who experienced medium sized reductions had an average caseload of 282 beneficiaries in 1987; while study physicians who experienced large reductions had the smallest 1987 average caseload of only 171 beneficiaries.

In 1988, the physicians within each of the four prevailing charge reduction classes experienced statistically significant increases in their average Medicare caseload: No Change/Increase, 27 ± 4, ($p<0.0001$); Small Reduction, 29 ± 2, ($p<0.0001$); Medium Reduction, 27 ± 2, ($p<0.0001$); and Large Reduction, 10 ± 2, ($p<0.0001$).

An analysis of variance revealed statistically significant differences in the average Medicare caseload increases across the four prevailing charge reduction classes ($p<0.0005$). Pairwise analysis among the classes reveals the average caseload increase for the Large Reduction class is consistently different from the increases for the other three classes. This suggests that the study physicians who faced the largest price reductions experienced the smallest caseload increase between the 2 years relative to all other physicians.

In addition to changes in the study physicians' Medicare caseloads, it is possible that the mix of patients within a physician's practice could change following a price reduction. Two characteristics of the beneficiary, race and economic status, were appended to the claims data. These characteristics were chosen as one way of identifying groups of Medicare beneficiaries that might be most "vulnerable" if physicians altered their practice characteristics in response to price changes.[5]

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[5] The source of the race variable was the Health Insurance Skeleton Eligibility Write-off File which contains selected entitlement and demographic data on all Medicare beneficiaries. Economic status was defined as poor or nonpoor. The SMI Premium

For each study physician's Medicare practice, the proportion of beneficiaries who are nonwhite and poor were calculated. There is wide variation across the States with respect to race and economic status; however, this variation appears to be a function of the underlying racial and economic composition of the respective States. For example, in 1987, 22 percent of Alabama Medicare beneficiaries are nonwhite; while in Oregon only 2 percent are nonwhite.

Figure 8 displays the average proportions of the study physicians' Medicare practices that are nonwhite and poor by 1987 self-designated specialty and year. Although there is up to a fourfold difference between general surgeons and other specialties in the average proportion of their respective Medicare practices that is nonwhite, the majority of specialties have between 6 and 12 percent of their Medicare practice comprised of nonwhites. With respect to temporal changes, ophthalmology and thoracic surgery were the only two specialties having statistically significant changes in the nonwhite proportion of their Medicare caseload, 0.3 ± 0.10 percent ($p<0.005$) and 1.0 ± 0.48 percent ($p<0.05$), respectively.

A similar cross-sectional pattern exists for the proportion of the study physician's Medicare practice that is poor. As with the previous analysis, study physicians within most of the specialties experienced no changes in the proportion of their caseloads that were poor. In contrast to the previous analysis, however, study physicians in two specialties experienced statistically significant declines in the percentage of their practices that were classified as poor, family practice and internal medicine. Appendix A-6 displays the paired t-test results.

Further examination shows that despite these declines in share of Medicare caseload that was poor, in 1988 the average studied family practice physician saw 3 more Medicare poor persons than in 1987, while the average studied internal medicine physician saw 2 more Medicare poor patients. The average size of the total Medicare practice in these specialties grew faster than did the numbers of poor Medicare patients seen. This may also be a reflection of the decline in the percentage of Medicare beneficiaries classified as poor in these 4 states from 9.6 percent in 1987 to 9.3 percent in 1988.

These findings would suggest that regardless of practice size or the level of price change, most study physicians' average caseloads increased in 1988. It appears,

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Accounting and Enrollment System file was the source of the economic status variable whereby beneficiaries whose states were paying the SMI premium were considered poor.

however, that study physicians whose price changes were the largest experienced the smallest increases in their Medicare caseloads. Further, analyses of two "vulnerable" subgroups of Medicare beneficiaries suggest that, in general, the proportion of Medicare caseloads classified as nonwhite and poor remained unchanged between 1987 and 1988.

Practice Characteristics: Types and Quantity of Services

The second aspect of physician Medicare practice characteristics to be addressed deals with the quantity and types of services provided before and after a price change. Three measures of quantity and types of services are analyzed: total Medicare revenue per physician, volume of the overpriced procedures and share of the Medicare practice revenue generated by different types of service.

Measures of total Medicare revenue will provide an indication of the study physician's total financial participation in Medicare. For purposes of this study, Medicare revenue is represented by total allowed charges and is calculated by multiplying the quantity of each service provided by the Medicare allowed charge. No adjustments have been made for balance billing or for bad debt from noncollection of the coinsurance or deductible. All dollars are expressed in nominal terms, but have been adjusted by the Practice Expense Component of the Geographic Practice Cost Index[6] to allow for cross-sectional comparisons.

Figure 9 displays the average total Medicare revenue per study physician per year by State and 1987 specialty designation. In 1987, the average Medicare revenue for study physicians in all four States combined was nearly $78,000. Cross-sectionally, Alabama exhibits the highest average revenue figure ($88,500), followed by Arizona ($76,663), Oklahoma ($72,670), and Oregon ($59,802). All four States exhibit similar revenue distributions with many physicians having modest levels of Medicare revenue and a few physicians with extremely high levels of Medicare revenue.

In 1988, average Medicare revenue increased 10 percent to roughly $86,000 across the four States. Paired t-tests of revenue change at the State level reveals that study physicians in all four States experienced statistically significant increases in their 1988 revenue: Alabama, $9,482 ± 821 ($p<0.0001$); Arizona, $9,079 ± 1156 ($p<0.0001$); Oklahoma, $9287 ± 1225 ($p<0.001$); and Oregon, $2137 ± 835 ($p<0.01$).

Greater variation in average Medicare revenue is observed at the specialty level than was observed at the State level. In 1987, the average Medicare revenue for ophthalmologists was $208,000 and for thoracic surgeons was $182,000; while average Medicare revenue for obstetricians/gynecologists was only $8,048. Neurology was the only specialty which did not experience a statistically significant increase at the 0.05 level in Medicare revenue in 1988. The most noticeable increase was for the cardiovascular specialists whose average Medicare revenue rose $33,000 or 23 percent between 1987 and 1988 from $142,000 to $175,000. Appendix A-7 displays the average Medicare revenue change by specialty and the associated paired t-test results.

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[6] The Practice Expense Component of the Geographic Practice Cost Index published in the Final Rule for the Medicare fee schedule (56 FR 59785) was used to adjust Medicare revenue.

For some of the physicians in the sample, the "overpriced" procedure payment reductions were of little consequence since prices were reduced for only 12 procedures. For those physicians who performed only a few of these procedures in 1987, the effect on their Medicare revenue should be minimal. In contrast, for those physicians who were highly dependent on one or more of the overpriced procedures in 1987, the effect on their Medicare practice revenue could be large.

Holding all other factors constant, a price reduction for the highly dependent physicians could result in a substantial reduction in Medicare revenue and provide incentives to physicians to alter their practice patterns. Thus, it may be instructive to analyze changes in Medicare revenue by the physician's level of dependence on the overpriced procedures to answer the important question: did physicians who were highly dependent upon the "overpriced" procedures experience a reduction in their Medicare revenue in 1988?

To answer this question, study physicians were assigned to one of four mutually exclusive categories based upon their 1987 level of dependence on all of the "overpriced" procedures. Dependence was calculated as the percent of the 1987 Medicare practice revenue derived from all of the "overpriced" procedures. The four categories of dependence are: (1) 0 to 10 percent; (2) 10.1 to 25 percent; (3) 25.1 to 50 percent; and (4) greater than 50 percent.

Figure 10 displays the average Medicare practice revenue by level of dependence category and year. Study physicians who were most dependent upon the "overpriced" procedures had a fourfold higher level of Medicare revenue than did the physicians who were least dependent on the "overpriced" procedures. In 1988, study physicians within each of the dependency categories experienced statistically significant increases in Medicare practice revenue: (1) $8,058 ± 545 ($p<0.0001$); (2) $8486 ± 866 ($p<0.0001$); (3) $7998 ± 1122 ($p<0.0001$); and (4) $8858 ± 3235 ($p<0.01$).

An analysis of variance of the revenue changes across the four categories reveals no statistically significant differences suggesting that study physicians who were highly dependent upon the "overpriced" procedures experienced an increase in Medicare revenue similar to those physicians whose dependence on the "overpriced" procedures was minimal. Thus, it appears that Medicare practice revenues for those physicians who were highly dependent upon the "overpriced" procedures were not negatively affected by the payment reductions.

The 1988 increase in Medicare revenue reflects the net effect of a variety of factors: a decrease in the "overpriced" procedures' prevailing charges; an increase in primary care services' prevailing charges by 3.6 percent; an increase in all other services' prevailing charges by 1 percent; and a change in the number of Medicare beneficiaries treated by a physician and the quantity of services provided as well as other factors. However, it would appear that not only were the study physicians generally able to recover any losses in their Medicare revenue from the "overpriced" procedure price reductions, but the average study physician increased his/her financial participation in Medicare.

A more direct question regarding access and utilization deals with the quantity and types of services which are provided before and after a price change. Did the volume of "overpriced" procedures provided change, or did the volume of other services provided to Medicare beneficiaries change? Table 2 displays the total quantity of services provided in 1987 and 1988 by the sample physicians. Across the 12 procedures, three procedures experienced a decline in total volume: hip replacements, transurethral prostatectomy, and suprapubic prostatectomy; while the remaining volumes increased between 1987 and 1988.

The variation in percentage increases or decreases in the aggregate numbers of procedures may represent changes in the indication for use of particular technologies, changes in the availability of physicians to perform a particular procedure, changes in the demand for a particular service or simply different points on the technology diffusion curve. Thus, changes in the total number of services supplied to Medicare beneficiaries provides little insight into how individual physicians' practices are changing.

One means by which to analyze changes in utilization from the physician practice perspective is displayed in Figure 11. For physicians who performed each of the "overpriced" procedures, the average share of their Medicare practice revenue which is derived from the "overpriced" procedure is presented for each of the 12 procedures by year. The shares are defined in terms of percent of Medicare annual revenue. Study physicians who perform CABGs and cataract extractions are highly dependent upon these procedures; while study physicians who perform suprapubic prostatectomies, pacemaker insertions, knee arthroscopies, bronchoscopies, and carpal tunnel repair derive less than 10 percent of their revenue from these procedures.

TABLE 2
Change in Total Number of "Overpriced" Procedures for Physicians Providing at least One "Overpriced" Procedure

Procedure	Year 1987	1988	Percent change
GI Endoscopy	23694	28261	19.3
Knee Arthroplasty	1814	2080	14.7
Carpal Tunnel Repair	1473	1687	14.5
Dilation & Curettage	1718	1900	10.6
Coronary Artery Bypass Graft	3209	3390	5.7
Bronchoscopy	5725	5974	4.4
Knee Arthroscopy	865	892	3.1
Cataract Extraction	37710	38567	2.3
Pacemaker Insertion	1974	2015	2.1
Transurethral Prostatectomy	7699	7488	-2.7
Hip Replacement	1887	1790	-5.1
Suprapubic Prostatectomy	192	146	-24.0

Source: 1987/1988 Medicare Claims Data for Alabama, Arizona, Oklahoma and Oregon
Notes: The volume figures represent the aggregate number of services for physicians who performed an overpriced procedure in either year.

Although there is wide variation in how dependent the study physicians are on the provision of the 12 procedures, there were statistically significant declines in the share of practice revenue derived from six of the "overpriced" procedures between 1987 and 1988: hip replacement, knee arthroscopy, pacemaker insertion, transurethral prostatectomy, suprapubic prostatectomy, and cataract extraction. Appendix A-8 displays the average changes in the share of revenue by "overpriced" procedure and the respective paired t-test results.

Given that shares of practice revenue derived from six of the "overpriced" procedures fell in 1988, it is important to look at changes in the share of revenue derived from other types of services to provide insight into changes in the study physicians' practice patterns. An example of such an analysis is provided in Figure 12 which displays practice shares by type of service for physicians who performed hip replacements or cataract extractions. Appendix A-9 displays changes in shares by type of service for hip and cataract physicians.

Between 1987 and 1988, the percentage of the average hip physician's Medicare revenue which was derived from hip replacements declined almost 2 percentage points ($p<0.0001$) from 11.8 to 9.9 percent. To a lesser extent, shares of revenue derived from knee arthroscopies and hospital visits fell from an average of 2.6 to 2.3 percent ($p<0.05$) and from an average of 3.8 to 3.4 percent ($p<0.0001$), respectively. At the same time, significant increases in the average share of revenue derived from three other types of services were noted: physician assistants (0.2 ± 0.4), durable medical equipment (0.2 ± 0.4), and medical visits (0.9 ± 0.2). The net result was an increase in average revenue in 1988 of roughly 8 percent ($6416 ± 1189 ($p<0.0001$).

The study ophthalmologists' average share of practice revenue derived from cataract surgeries fell from 51.4 in 1987 to 50.2 percent in 1988 ($p<0.005$). Declines in the average share of revenue derived from being an assistant-at-surgery (-0.2 ± 0.09), billings for laboratory services (-0.01 ± 0.005), durable medical equipment (-0.7 ± 0.1) and radiology services (-1.1 ± 0.11) were also observed. At the same time, increases in the average share of revenue derived from other eye procedures (2.1 ± 0.38), medical visits (1.5 ± 0.4) and anesthesia services (0.05 ± 0.03) were observed.[7] The net result was an increase in average revenue in 1987 and 1988 of approximately 4 percent ($8,870 ± 3254 ($p<0.01$).

Analyses of physician Medicare practice characteristics suggested that, in general, the study physicians did not experience changes in the types of beneficiaries which they treated, but did experience modest increases in their average caseload in 1988. The results from the analyses of quantity and types of services is more complex. In general, financial participation in Medicare increased in 1988, but the share of the study physician's practice revenue from the overpriced procedures fell. It would appear that studied physicians were able to recover losses in their Medicare revenue from the "overpriced" procedure price reductions with increases in the shares of their practice revenue derived from other types of services.

SUMMARY

The Physician Monitoring System is designed to provide measures of physician supply, utilization of Medicare services, and level of participation in the Medicare program from the physician practice perspective using Medicare claims data. Two data files comprise the Physician Monitoring System: the National Claims History Physician/Supplier Procedure Summary File (NCH/PSP) and the National Claims History Physician File (NCH/PF).

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[7] All differences are statistically significant at the 0.05 level or better.

The NCH/PSP file uses information from 100 percent of Medicare services and assembles the data for analysis by procedure code at the specialty and locality level based upon the place where the service was rendered. Data for three quarters of 1991 were presented to demonstrate the types of tables which will be generated to monitor physician payment reform.

The NCH/PF file contains all claims for a sample of physicians who provide Medicare services. The NCH/PF will be annual files starting in 1992 and will allow for national as well as State-specific analyses at the physician level. Since the development of the 1992 NCH/PF file is not complete, it was not possible to provide data from these files for this report. However, we were able to provide examples of the types of physician-level analyses that can be performed by providing descriptive analyses from a research project conducted in HCFA on physician response to the OBRA 1987 "overpriced" procedure price reductions.

To provide a view of access and utilization from the physician practice perspective, the availability of physicians who treat Medicare beneficiaries and physician Medicare practice characteristics were analyzed. Two questions were addressed by analyzing physician availability: (1) did the number of physicians providing services to Medicare beneficiaries change between 1987 and 1988; and (2) did the number of physicians performing particular services change coincident with the level of the fee reduction. Physician availability as measured by number of physicians treating Medicare beneficiaries or performing "overpriced" procedures did not change substantially between 1987 and 1988 in spite of price reductions for these surgical procedures.

Three characteristics of a physician's Medicare practice were analyzed to provide answers to two access and utilization questions: (1) did the quantity and types of beneficiaries physicians treat vary between 1987 and 1988 or with the degree of price change; and (2) did the quantity and types of services provided by physicians change when relative prices were altered.

The results from the analyses of changes in Medicare caseloads suggested that regardless of practice size or level of price change, most of the study physicians experienced increases in their Medicare caseload. It appears, however, that the study physicians who faced the largest price increases experienced the smallest increase in their caseload in 1988. In general, the average share of a physician's Medicare practice for two "vulnerable" groups of Medicare beneficiaries, the nonwhite and the poor, remained constant between the 2 years.

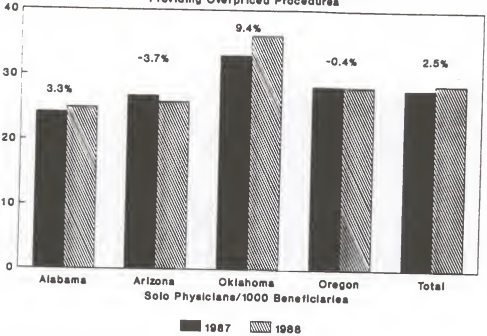
The results from the analyses of changes in quantity and types of services provided to Medicare beneficiaries are more complex. There was strong evidence that the study physicians continued to provide services to Medicare beneficiaries and increased their financial participation in the Medicare program in 1988. Average Medicare revenue increased 10 percent between the 2 years in spite of price reductions for the 12 procedures and only modest increases in fees for other services. Even study physicians whose Medicare practices were highly dependent on the "overpriced" procedures did not appear to be adversely affected by the price cuts. These physicians experienced a 4 percent increase in their 1988 Medicare revenue.

There was also evidence that the study physicians continued to provide "overpriced" procedures, but they appeared to rely more on the provision of other services to Medicare beneficiaries. Thus, the study physicians who suffered losses in their Medicare revenue from the "overpriced" procedure price reductions were able to recover these losses with increases in the share of their practice revenue derived from other types of services.

The analyses of access and utilization from the physician perspective which were provided in this chapter were confined to four States, 2 years and primarily solo-practitioners, thereby, limiting the generalizability of these results. Implementation of the Medicare fee schedule will result in significantly more price changes and in all States, thereby, increasing the complexity and scope of future analyses.

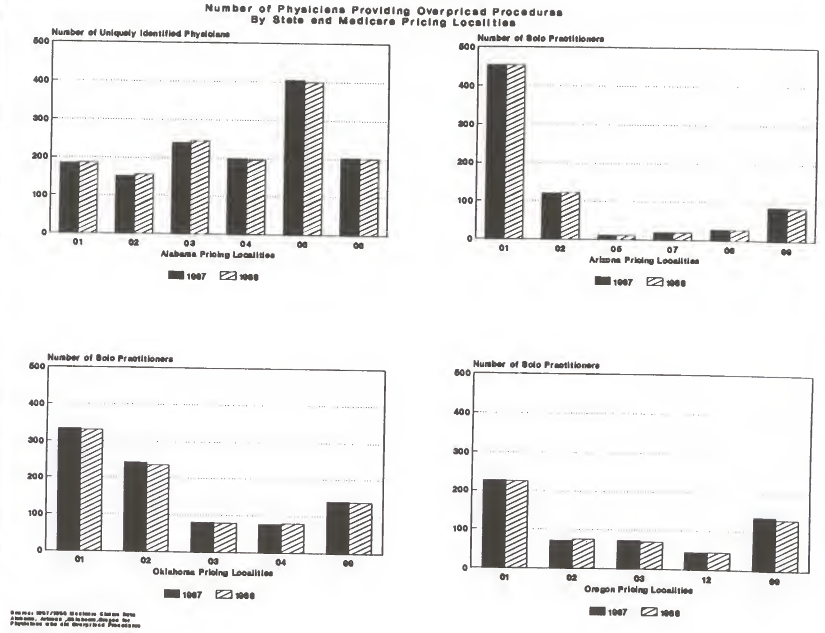
The figures provided from these analyses were illustrative of the types that could be provided to study changes in access and utilization from the physician practice perspective. Given the increase in complexity of studying physician payment reform, it may be necessary to alter the scope of analyses performed. For future reports, careful consideration will be given to which analyses will provide the greatest prospects for capturing changes in access and utilization from the physician perspective.

Figure 1
Rates of Solo Physicians/1000 Beneficiaries
Providing Overpriced Procedures



Source: 1987/1988 Medicare Claims Data:
Alabama, Arizona, Oklahoma, Oregon for
Physicians who did Overpriced Procedures

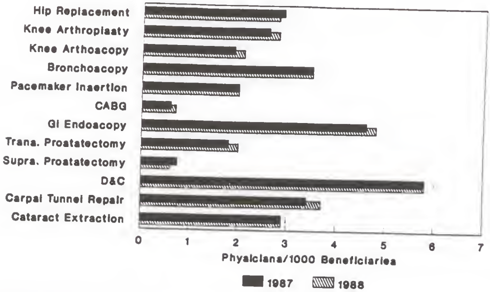
Figure 2



Number of Physicians Providing Overpriced Procedures By State and Medicare Pricing Localities

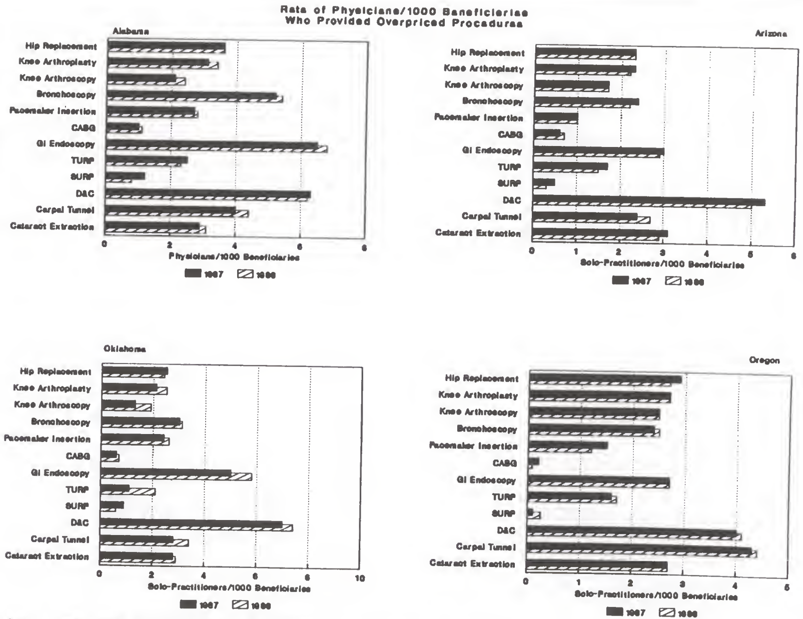
Source: 1987/1988 Medicare Claims Data
Alabama, Arizona, Oklahoma, Oregon for
Physicians who did Overpriced Procedures

Figure 3
Rate of Physicians/1000 Beneficiaries
Providing Overpriced Procedures



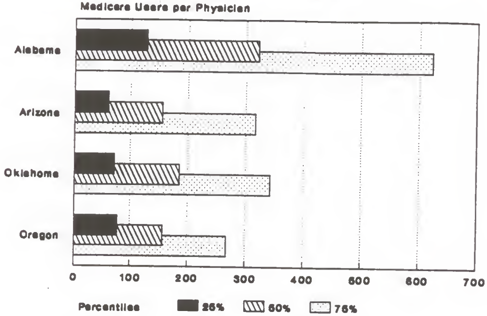
Source: 1987/1988 Medicare Claims Data
Alabama, Arizona, Oklahoma, Oregon for
Physicians who did Overpriced Procedures

Figure 4

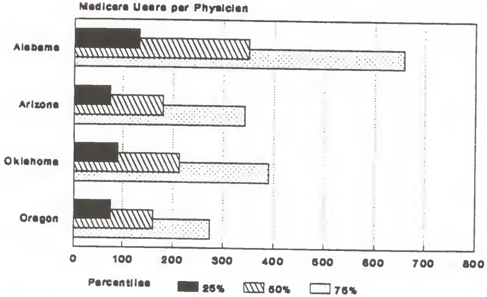


Source: 1987/1988 Medicare Data from Alabama, Arizona, Oklahoma and Oregon

Figure 5
Distribution of Medicare Caseloads
Across Physicians by State: 1987

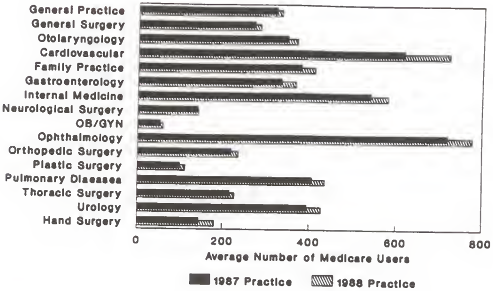


Distribution of Medicare Caseloads
Across Physicians by State: 1988



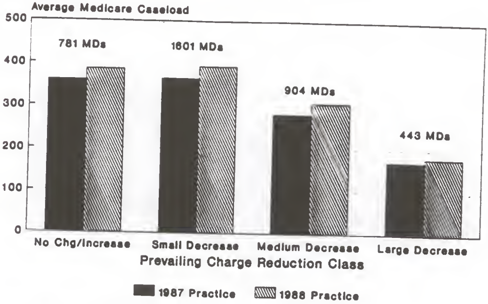
Source: 1987/1988 Medicare Claims Data
Alabama, Arizona, Oklahoma,Oregon for
Physicians who did Overpriced Procedures

Figure 6
Average Physician Medicare Caseload
By 1987 Specialty and Year



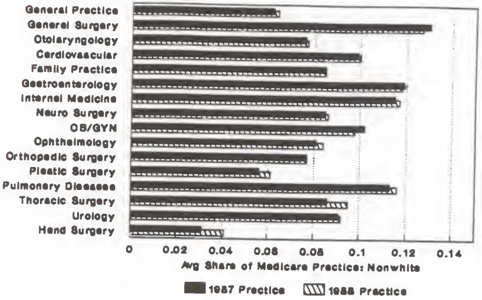
Source: 1987 & 1988 Medicare Data
Alabama, Arizona, Oklahoma, Oregon for
Physicians who did Overpriced Procedures

Figure 7
Average Physician Medicare Caseload
By Reduction Class and Year

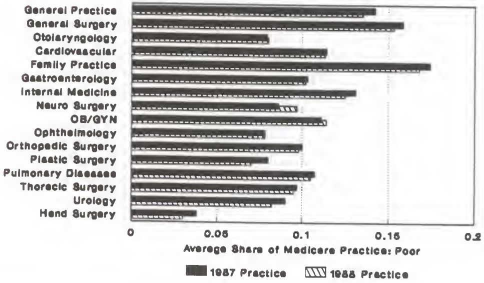


Source: 1987/1988 Medicare Claims Data
Alabama, Arizona, Oklahoma, Oregon for
Physicians who did Overpriced Procedures

Figure 8
Share of Medicare Practice: Nonwhite
By 1987 Specialty and Year

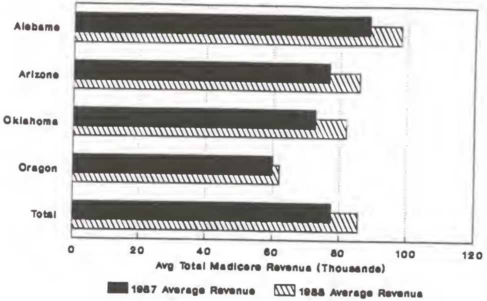


Share of Medicare Practice: Poor
By 1987 Specialty and Year

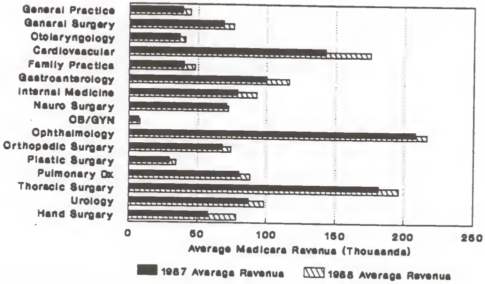


Source: 1987 & 1988 Medicare Claims Data
Alabama, Arizona, Oklahoma, Oregon for
Physicians who did Overpriced Procedures

Figure 9
Average Total Medicare Revenue Per Physician By State and Year

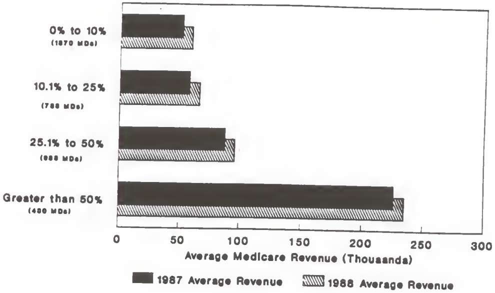


Average Total Medicare Revenue Per Physician By 1987 Specialty and Year



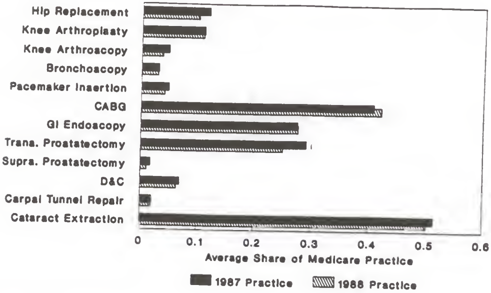
Source: Medicare data: Al. Az. Ok. Or
Total Revenue is calculated for 9 Months
$ adjusted by GPCI, but in nominal terms

Figure 10
Avg Medicare Revenue/Physician By Level Of Dependence on Overpriced Procedure



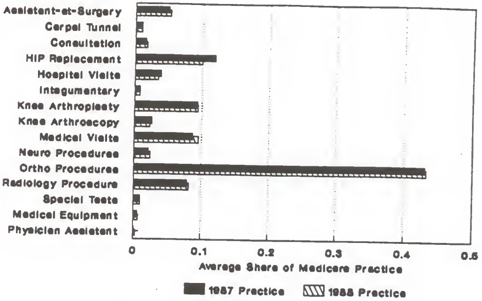
Source: 1987/1988 Medicare Claims Data
Alabama, Arizona, Oklahoma, Oregon for
Physicians who did Overpriced Procedures

Figure 11
Average Share of Medicare Practice
Derived From Overpriced Procedures

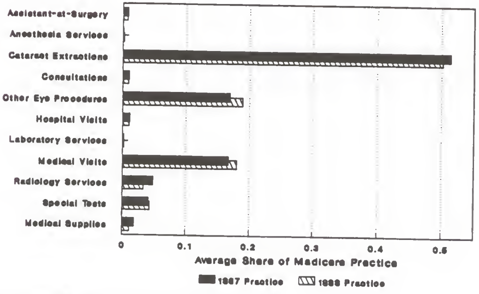


Source: 1987/1988 Medicare Data from Alabama, Arizona, Oklahoma, Oregon for Physicians who did Overpriced Procedures

Figure 12
Average Share of Medicare Practice by Type of Service for HIP Physicians



Average Share of Medicare Practice by Type of Services for Cataract Physicians



Source: 1987/1988 Medicare data: Alabama
Arizona, Oklahoma Oregon for Physicians
who did Overpriced Procedures

Chapter 4

Use and access to Medicare physicians' services, 1986-90

INTRODUCTION

Chapter 3 of this report illustrates the types of analyses that can be undertaken in monitoring changes in physician practice characteristics. This chapter begins the analysis of trends in Medicare physician allowed charges and use of services in the years prior to physician payment reform implementation (calendar years 1986 through 1990), with the beneficiary as the unit of analysis. The analyses for these years serve as the baseline for monitoring changes in the post reform implementation period. As discussed in Chapter 1, there were a number of other legislative initiatives and payment reforms that occurred in the years preceding the implementation of the Medicare fee schedule and whose effects will continue into the post baseline period. Therefore, although the longitudinal analyses planned for this report will provide some suggestive evidence of physician payment reform impacts, other trends and influences must also be considered.

There are two types of analyses presented in this chapter. The first is a longitudinal analysis, from 1986 to 1990, focusing on allowed charges for Medicare physician services by type of service. The second focuses on the use of selected services, by age, sex, and race of the beneficiaries and by urban and rural groups. The purpose of the first analysis is to examine the trend in allowed charges by type of service in order to show where the growth in expenditures has been occurring. Because the emphasis in future analyses will be on subgroups of the Medicare population, the second section shows use of services by population based rates (services per 10,000 beneficiaries).

Analytical Approach

Particular importance is attached to demographic variation in use of and access to care. It is well documented that, for certain conditions and procedures, black persons use less medical care than do white persons, despite having higher mortality and morbidity rates (HCFA 1990a, HCFA 1990b, JAMA 1990, NCHS 1990). Persons in rural areas are reported to be disadvantaged relative to persons in urban areas, with respect to income, mortality rates and supply-side measures of access such as physician to population ratios (OTA 1990, Hewitt, 1989). Another population subgroup thought to be particularly vulnerable are the older elderly (e.g. those over age 85).

Because differential access to health care has existed before the implementation of physician payment reform, the intent of this physician payment reform monitoring activity is to measure changes in use rates for all beneficiaries combined, as well as changes in "relative" use of medical services[1]. For example, Medicare aged black male beneficiaries have been only one-fifth as likely to receive a CABG as were Medicare aged white males (HCFA 1990b). If the number of CABGs per 1,000 persons declines after the introduction of physician payment reform, it might be inferred that physician payment reform has had the effect of reducing access (or at least use) of this procedure in the aggregate. However, if the ratio of white to black use of CABG remains at five to one, then there would be no evidence that physician payment reform had a differential impact (i.e., it did not exacerbate access differences). It is also possible that an overall reduction in access in white utilization could take place while black utilization increased, thereby reducing the ratio. Such changes would merit closer analyses.

There are inherent limitations in the use of administrative/claims data for measuring access to care. Important variables not available for analysis are measures of need or health status. Available demographic characteristics, primarily age, sex, and race, are used as proxy measures of health status or need or to define vulnerable subgroups. Older persons have a higher rate of health problems than younger persons and therefore are expected to use more services. In addition to being a necessary delineation for procedures such as prostatectomy and hysterectomy, sex also is indicative of some variations in illness. For example, males have higher rates of heart disease and lung cancer than do females. Females are more likely to have hip fractures due to osteoporosis or be diagnosed as having depression than are males. Race is used implicitly as a proxy measure both for health status (black persons have higher rates of morbidity and mortality for many conditions than white persons), and socio-economic status (poverty is much greater among black persons).

Still, these are very rough proxy measures. For example, access to major cardiovascular procedures is only relevant for those persons with heart disease. Generally, it is not possible to identify disease specific subgroups from Medicare administrative data[2]. Thus the measures of access and utilization are broad descriptions of service use for large, relatively heterogeneous groups. In addition, the issue of appropriateness of services is largely unaddressed in the following analyses, because clinical guidelines are needed to define types and levels of appropriate services. Guidelines are still being developed by organizations such as the Agency for Health Care Policy and Research (AHCPR).

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[1] As discussed in Chapter 1, utilization rates are commonly used as measures of access. This chapter follows this conventional approach and will use the two terms interchangeably.

[2] The Medicare Current Beneficiary Survey and the Medicare Registry are potential sources of identifying disease specific risk groups for future analyses.

Data

Data for this study were taken from the beneficiary BMAD files, for 1986 through 1990. The beneficiary BMAD data provide detailed procedure level information on services received by a 5 percent random sample of Medicare beneficiaries. Data are aggregated by the year in which the service was received. There are roughly 23 million records in the beneficiary BMAD files per year. Procedural coding is based on the CPT-4 codes for physician services[3]. The BMAD beneficiary files were merged with Medicare beneficiary enrollment files in order to calculate rates of services per 10,000 beneficiaries.

The 5 percent BMAD beneficiary files used in these analyses are constructed from billing data submitted to HCFA from carriers. The cut-off date for file construction is March following the year of interest. For example, the calendar year 1990 data are comprised of bills received through March of 1991. As such, there is always an expected degree of incompleteness in the data. Variations in the degree of incompleteness across years may affect the overall trends.

Another data limitation concerns carrier variations in both the use of national codes and the substitution of local codes. Unlike ICD-9-CM codes used for inpatient hospital stays, the CPT-4 codes are primarily billing items and as such are subject to much greater local use and interpretation. Furthermore, local codes specific to each carrier, have been used that do not fit into a universal coding scheme. Consequently, a certain amount of inconsistency in coding will be a limitation to the interpretation of the data.

Classification System Used

The HCPCS, which contains all CPT-4 as well as HCFA-specific codes, are much too detailed (there are over 7,000 individual codes) for meaningful analysis of beneficiary use of services. For example, there are nine different codes for CABG based on the number of grafts and whether the graft is autogenous or non-autogenous. Such distinctions are important for payment purposes or for specific studies of CABG but are too detailed for examining differences across population subgroups. At the same time, the broad type of service classifications available on the BMAD files (medical, surgical, consultation, durable medical equipment, etc.) lack clinical distinctions that may be important to track.

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[3] Only physician services covered under the Medicare Fee Schedule are included in this chapter. Supplies and services such as durable medical equipment, laboratory tests and ambulance are excluded. In addition, some physician services such as the monthly capitation payment for dialysis care are not included in the Medicare Fee Schedule and are also excluded from this chapter. As a result, these analyses cover roughly 80 percent of all Medicare covered charges included in the BMAD files.

For several previous projects, the Urban Institute has developed a type of service classification system for analyzing the growth in Medicare physician expenditures (Berenson and Holahan, 1990), changes in volume and intensity of services (Zuckerman and Holahan, 1991), and geographic variations in volume and intensity of services (Holahan and Zuckerman, 1991). This system included 21 mutually exclusive and exhaustive categories of physician services. Visits and consultation (medical) services were categorized by place of service (office, hospital, nursing home, etc.). Surgical procedures were categorized by intensity (major, minor, and ambulatory) and some distinction was made by body system. Major procedures have separate categories for cardiovascular and orthopedic procedures; ambulatory procedures have a category for eye procedures. There are four subcategories within imaging procedures and separate categories for services such as oncology and endoscopy.

For this project, a further level of clinical specificity was developed by researchers at the Urban Institute (Holahan, et al) and in the Office of Research and Demonstrations in HCFA. The 21 original type of service categories were further partitioned to represent specific procedures and types of medical care. In all, there are 77 distinct categories of services[4]. The 77 categories are displayed in Tables 2 through 4 in the Results section. The ranges of HCPC codes which fall into each type of service are shown in Appendix B.

The tables and analyses shown in this report were prepared by HCFA staff, from tables generated by the Urban Institute. For each type of service, total allowed charges and number of services were compiled. Total allowed charges reflect the sum of all allowed charges for the HCPC codes within a given type of service. Counting services is more complex. There may be more than one physician billing for a single procedure. An example would be a major surgical procedure such as CABG in which there could be an attending surgeon's bill as well as one for each assistant at surgery. From the perspective of use and access to care, only one event has taken place, despite the billing for multiple services. The count of services used in the following analysis is based, as far as possible, on unduplicated individual surgical events. For example, a bill from an assistant at surgery is not counted as a separate service. Because of this, calculating average allowed charges per service from the charge and service data in this chapter will not be indicative of average "prices." Such an average allowed charge would be more indicative of total billed physician charges for a given service[5].

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[4] Not all services could be classified into one of the 77 groupings, primarily due to local codes. In 1990, the unclassifiable services represented only 1.4 percent of Part B allowed charges.

Variations in treatment can be more effectively tracked with the 77 categories than with the original 21 categories. For example, the original category "major cardiovascular procedures" has been divided into six subcategories: CABG, aneurysm repair, thromboendarterectomy, percutaneous transluminal coronary angioplasty (PTCA), pacemaker insertion, and all other. During the second half of the 1980s, use of CABG increased only modestly while PTCA increased very rapidly (see Results section). Such distinctions are missed with broader categorizations.

The demographic analysis in this chapter will have the following categories: gender (male and female), race (white, black, other and unknown), age and urban/rural. Age groups include three groups for the disabled population (less than 45, 45-54, and 55-64) and five groups for the aged (65-69, 70-74, 75-79, 80-84, and 85 and over)[6].

Urban/rural designations are based on two levels of categorization. First, counties are separated into MSA and non-MSA categories. The non-MSA counties are further divided into very rural (less than 35 persons per square mile) and rural (35 or more persons per square mile) groups. MSA counties are divided into four size groupings: (1) very large (3 million or more residents), (2) large (1-3 million residents), (3) medium (250,000 to 1 million residents), and (4) small (less than 250,000 residents).

RESULTS

Allowed Charges

Table 1 shows Medicare allowed charges[7] for physician services for the years 1986 through 1990, by three broad categories. Tables 2 through 4 examine these categories in more detail. Total allowed charges for physician services increased from $19.5 billion in 1986 to $29.4 billion in 1990, an average annual increase of 10.8 percent. The two largest categories of services are visits and consultations, and procedures. Visits and consultations increased at an annual rate of 11.5 percent during these years whereas procedures increased at an average annual rate of 9.7 percent. In 1990, visits and consultations, and procedures accounted for 38.4 percent and 47.3 percent of physician services, respectively. The distinction between services designated as visits and consultations and services designed as procedures is not always precise. Because the categorization is based on the CPT-4 codes, a certain amount of pre-operative and post-operative visit and consultation care may be contained in the procedure categories. The imaging category had the highest rate of growth at 12.7 percent per year. Consequently, this category increased from 13.3 percent of all physician charges in 1986 to 14.3 percent in 1990.

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[5] Future reports will show charges within type of service category due to assistants at surgery.

[6] Persons with end-stage renal disease are not shown separately but are included within the disabled and aged populations.

[7] All analyses in this section are based on nominal charges, that is, charges unadjusted for inflation.

Table 2 shows trends in charges for visit and consultation services in more detail. Office visits, accounting for 34.9 percent of visit and consultation charges in 1986, increased at an annual rate of 11.6 percent. New office visits increased slightly more rapidly than did established office visits, but by 1990, still accounted for only 4.1 percent of visit and consultation services. Charges for services provided in the hospital setting showed a slower than average increase (9.4 percent per year). This is probably due in part to the decreasing rate of hospitalization among the Medicare population during these years. There was a 6.5 percent decline in hospital days per 1,000 persons from 1985 through 1990 (1990 PPS Impact Report to Congress). Visits to hospital patients decreased from 34.5 percent of visit and consultation charges in 1986, to 31.9 percent in 1990. An exception was for physician critical care visits, which increased by an annual rate of 17.6 percent per year. Physician emergency room visit charges increased at an annual rate of 18.9 percent.

Charges for physician services provided in nursing homes increased at an annual rate of 9.6 percent while visits in the home increased by only 1.8 percent per year. All types of specialist evaluation services increased markedly during these years, ranging from 14.9 percent per year for pathology to 21.2 percent per year for other specialists. As a result, specialist evaluation charges increased from 11.8 percent of all visit and consultation charges in 1986 to 14.6 percent in 1990.

Allowed charges for procedures are shown in Table 3. Although the rate of increase across this timeframe was 9.7 percent per year, it was only 6.6 percent from 1989 to 1990. There are four subcategories of major procedures: general, cardiovascular, orthopedic, and eye. General major procedures had the lowest rate of increase at 3.7 percent per year. Five of the procedures under this subcategory[8] were identified as

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[8] Colectomy, Cholecystectomy, TURP, Hysterectomy, and disk surgery. Identification of overvalued procedures was a joint effort of HCFA, the Physician Payment Reform Commission (PPRC), and researchers at Harvard University and the Center for Health Economics Research (CHER). Based on this research, Congress

"overvalued" procedures and were subject to price reductions beginning as early as April 1, 1988. Price reductions for TURP began in 1988, and the total charges for TURP reflect this with increases in total charges from 1986 to 1987, followed by decreases in each of the 3 subsequent years. Total charges for colectomy increased most years through 1989, and then declined in 1990, coincident with the price change. On the other hand, total charges for cholecystectomy began to decline in 1988, 2 years prior to the price change. Hysterectomy charges began to decline 1 year prior to the price changes. Despite price reductions, allowed charges for disk surgery increased in all years.

Although allowed charges for major cardiovascular procedures increased at a rate about average for all procedures (9.8 percent) there was considerable variation within this category. The fastest growth in allowed charges was for PTCA, increasing from $44 million in 1986 to $152 million in 1990, a 36.5 percent increase per year from 1986 through 1990. In 1990, the rate of increase was still at 28.3 percent. CABG experienced a rate of growth slightly lower than the overall average. Other procedures such as aneurysm repair and pacemaker implant had very modest rates of growth at about 2 to 3 percent per year, and thromboendarterectomy actually showed a decline in allowed charges during these years.

Four of the cardiovascular procedures were identified as overvalued procedures. CABG and pacemaker implants were subject to price reductions in 1988. Allowed charges for CABG increased by 21.1 percent from 1986 to 1987. From 1987 through 1990, the annual rate of increase was only 5.5 percent. For pacemaker implants, total allowed charges decreased slightly from 1987 through 1990, after increasing by 8.6 percent from 1986 to 1987. Allowed charges for pacemakers decreased in 1988 and 1990, years in which price reductions occurred, but not in 1989. Aneurysm repair and thromboendarterectomy were subject to price changes in 1990. Aneurysm repair experienced a decline in allowed charges in 1990, following steady increases in the previous years. The 1990 decrease for thromboendarterectomy was larger than in previous years. Much of the overall downward trend for thromboendarterectomy may be attributable to concerns in the medical community about outcomes and guidelines for treatment.

Among major orthopedic procedures, hip repair and hip replacement showed modest rates of growth in allowed charges (3.1 percent and 1.0 percent per year, respectively), while knee revisions increased by 12.1 percent per year. Hip replacement, with price

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Center for Health Economics Research (CHER). Based on this research, Congress passed legislation reducing the prevailing charges for these procedures.

reductions beginning in 1988, showed no change in total allowed charges in either 1988 or 1989, and a 9.6 percent decrease in 1990. Knee revisions, although also incurring price reductions, experienced growth in allowed charges throughout the timeframe.

The largest procedural category in Table 3 are major procedures on the eye, accounting for 20.5 percent of procedure charges in 1986, and 20.8 percent in 1990. The largest subcategory is lens extraction with insertion of an intraocular lens implant, which increased from $1,455 million in 1986 to $1,875 million in 1990, 13.5 percent of all procedural charges in 1990. (As an overvalued procedure, lens extraction had its first price reduction in 1987.) However, allowed charges continued to increase throughout the time period. Treatment of retinal lesions had a growth rate of 17.4 percent from 1986 through 1990. However, the growth rate was only 4.9 percent in 1990, the first year that reductions in price occurred as an overvalued procedure. The "other" category include some overvalued cataract procedures. Although this category continued to increase throughout the time period, the effects of price reductions are muted due to their inclusion with other services.

Allowed charges for ambulatory procedures increased at an annual rate of 10.0 percent per year. Lithotripsy increased very rapidly during most of these years, except for 1990, when the increase was only 5.6 percent, very likely reflecting, in part, the effect of a reduction in the price levels. Hernia repair had a slow, but consistent, increase in allowed charges through 1989. However, allowed charges in 1990 declined, coincident with the introduction of price reductions as an overvalued procedure. The remaining categories (minor procedures, oncology, endoscopy, tests, and anesthesia) increased at rates ranging from 8.6 percent per year (anesthesia) to 16.9 percent per year (minor procedures). Within the endoscopy category, arthroscopy, colonoscopy and bronchoscopy were subject to price reductions. However, total allowed charges continued to increase for all three, very likely reflecting increasing use rates. In the test category, allowed charges for electrocardiograms increased by only 7.2 percent per year and (as an overpriced procedure) actually decreased slightly in 1990. However, allowed charges for cardiovascular stress tests, also identified as an overpriced procedure, increased by 17.9 percent per year and by 10.2 percent in 1990.

Medicare allowed charges for imaging services are shown in Table 4. Standard imaging (primarily x-ray technology) increased at an annual rate of 7.9 percent per year, much lower than the other imaging categories. As a result, standard imaging decreased from 50.4 percent of all imaging charges in 1986, to 42.5 percent in 1990. Exceptions within the standard imaging category were breast imaging (mammography) and nuclear medicine which increased at 27.2 percent and 10.8 percent per year, respectively.

Advanced imaging increased at an annual rate of 17.8 percent, from $435 million in 1986 to $836 million in 1990. Much of this increase was due to Magnetic Resonance

Imaging (MRI) services which totaled $38 million in 1986, but accounted for over $241 million in Medicare allowed charges by 1990. Computerized tomography (CT) scans of the body also increased rapidly during these years while CT scans of the head increased at 12.2 percent per year from 1986 to 1988 but decreased in 1989 and 1990.

Sonography increased at over 18 percent per year from 1986 through 1990. This was due in large part to the 27.3 percent annual increases in echography-heart. Echography-heart accounted for 7.1 percent of all imaging charges in 1986, and 11.5 percent in 1990.

Other imaging/procedures also increased rapidly during these years, from $370 million in 1986 to $622 million in 1990. The major procedure in this category is cardiac catheterization, which increased from $210 million in 1986 to $435 million in 1990, a 20.0 percent annual increase.

Service Use by Demographic Category

Tables 5 to 7 present data for selected services received in 1990. Tables 8 and 9 present data for the period 1986 to 1990 for office visits and for cataract surgery.

Table 5 shows the number of services per 10,000 Medicare beneficiaries for selected visit and consultation services in 1990. The most common type of visit is "office visit, established." There were almost 43,000 established office visits per 10,000 Medicare beneficiaries, or over 4 visits per person. The number of established office visits tended to increase with age, rising from 23,485 per 10,000 for persons ages less than 45 to 54,373 per 10,000 for persons ages 80 to 84. The rate declined slightly for persons over age 85, very likely reflecting, in part, the fact that a much higher percent of persons 85 years of age and over are in long-term care facilities and received physician visits in that setting[9]. Black beneficiaries used established office visits 10 percent less frequently than did white beneficiaries (38,800 per 10,000 and 43,069 per 10,000 respectively). Use of established office visits was also more common among women (44,610 per 10,000) than among men (38,864 per 10,000). Increasing urbanization was also associated with higher use rates, with a 22 percent differential between the use rate in the very rural areas (37,156 per 10,000) and the very large MSA areas (47,825 per 10,000).

Table 5 also provides comparisons of relative rates of services between specific subgroups. The comparison reflects the ratio of the rate of service for a subgroup divided by the rate of service for a reference group. (The relative rate for each reference group is 1.00.) The relationships between demographic groups in use rates were not consistent across all types of visits and consultations services. For example, for established hospital visits the age effect was U-shaped with rates declining from the youngest age group (under age 45) up through the 65 through 69 age group and then rapidly rising after that point. Persons ages 85 and over had almost 4 times as many established hospital visits as did persons ages 65 through 69.

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[9] Physician services in nursing homes per 10,000 beneficiaries are not shown.

Black beneficiaries had 31 percent more established hospital visits than did white beneficiaries and women had fewer established hospital visits than did men. For consultations, the same patterns held; that is higher use rates for black and male beneficiaries than for white and female beneficiaries. However, use of ophthalmology services followed the pattern for established office visits with higher rates for white and female beneficiaries than for black and male beneficiaries. In all evaluation/management services the degree of urbanization was associated with increased use of services. The strongest effect was for consultations in which the use rate was over twice as great in the very large MSA areas (5,435 per 10,000) as in the very rural areas (2,365 per 10,000).

Use rates by demographic category showed different patterns for selected procedures (Table 6). For some procedures, there was a strong linear effect of age, probably reflecting the underlying rates of illness. TURP and cataract removal/lens implant followed this pattern with very few procedures in the under 65 population and rates for the oldest groups (80 and over) of two and one-half to three and one-half times as great as for persons ages 65 through 69. On the other hand, for the more invasive heart procedures such as CABG and PTCA, rates for persons over age 80 fell rather sharply, despite the fact that heart disease is more prevalent in the oldest age groups. Knee replacement and colonoscopy were two additional procedures where use increased with age except for the oldest age group (85 years and over).

With the exception of upper GI endoscopy, black beneficiaries used fewer services for these procedures than did white beneficiaries. This was most noticeable for CABG and PTCA where the use rates for black beneficiaries were only one-fourth and one-third as great as for white beneficiaries. This is consistent with the findings reported in the chapter on inpatient utilization rates. Use rates for TURP, knee replacement, cataract removal, and colonoscopy were 19 to 37 percent lower for black beneficiaries than for white beneficiaries.

Females had much lower use rates for the cardiovascular procedures than did males. For females the number of CABGs per 10,000 was only one-third as great as for males and the number of PTCAs was only one-half as great. On the other hand, females were much more likely to receive a knee replacement or a cataract removal/lens implant than were males.

Unlike the situation with evaluation/management services, there was little variation in use of these procedures by degree of urbanization. There was only a 10 percent difference across all types of areas in the use of TURPs with the lowest rate in the very large MSAs and the highest rates in the small MSAs and in the very rural areas. There was no consistent pattern of use for either CABG or PTCA. Interestingly, the rate of knee replacement was lowest in the very large MSAs with all other areas having use rates of 27 percent to 55 percent greater than the very large MSAs. The only procedure in which there was a consistent increase in use rates with increasing urbanization was colonoscopy.

Imaging services by demographic category are shown in Table 7. Age effects varied considerably. For example, use rates increased with age for standard chest imaging (primarily x-ray), CT scans for places other than the head, and for echography of the heart. However, use rates tended to decline for the older age groups for standard imaging of the breast (primarily mammography), MRI for places other than the head, and for cardiac catheterization.

Race effects also varied by type of imaging. Black beneficiaries were much less likely than were white beneficiaries to receive standard breast imaging and cardiac catheterization. However, black beneficiaries had rates of CT scans that were very similar to white beneficiaries and were more likely than white beneficiaries to receive both standard chest imaging and echography of the heart.

For most of the selected imaging procedures female beneficiaries had use rates roughly 10 percent lower than for male beneficiaries. However, for cardiac catheterization the rate for females was only about one-half as great as for males, a finding consistent with those found in the more invasive cardiac procedures shown in Table 6.

The effect of urbanization on use of imaging services was fairly consistent with use rates higher in the more urban areas. For two imaging services, MRI and echography-heart, there was a twofold difference in use rates between very rural areas and very large MSA areas. The degree of discrepancy was much less for other imaging procedures. For example, rates of cardiac catheterization in very rural areas was only 16 percent lower than in very large MSA areas.

In addition to examining age, sex, race, and urbanization differences in use of physician and related services, it is important to know whether or not these relationships are changing over time. Changes in use rates are examined next for established office visits (Table 8) and cataract removal/lens implants (Table 9).

There were 36,309 established office visits per 10,000 Medicare beneficiaries (or 3.6 visits per beneficiary) in 1986. This increased to 42,739 (4.3 visits per beneficiary) in 1990, representing a 4.2 percent annual rate of change. The increase was fairly uniform across all age, sex, race and urban/rural categories although there were some potential shifts in use patterns. For example, all three age groups in the disabled category experienced lower rates of growth than average. Although disabled persons received more established office visits in 1990, than in 1986, disabled persons use rates were farther from the average in 1990. There may also be a slight decline in use of established office visits for black beneficiaries relative to white beneficiaries. Use rates for black beneficiaries were 6 percent lower (than white beneficiary use rates) in 1986 and 10 percent lower in 1990. Table 8 also shows considerable variation in relative use rates by year. For example, in 1986 beneficiaries in the very rural areas had 18 percent fewer established office visits than beneficiaries in the very large MSAs. In 1988, there was a 14 percent difference, but by 1990, there was a 22 percent difference. It is important to note that even with very large aggregates of beneficiary groups, there is a considerable amount of year to year fluctuation in use rates, thus making inferences about policy impacts based on short term data fairly uncertain.

Use rates for cataract removal/lens implants by year is shown in Table 9. The number of services per 10,000 persons increased by 40 percent between 1986 and 1990, from 342 per 10,000 to 480 per 10,000. This rate of growth was fairly consistent for all age groups over the age of 45. Cataract removal/lens implants is most common for persons in the 80 to 84 age group at 828 per 10,000 (1990), a rate three and one-half times greater than for persons ages 65-69.

The annual rate of increase in cataract removal/lens implants was greater for black beneficiaries (11.2 percent) than for white beneficiaries (9.1 percent). Thus, there was some narrowing of the relative use rates between the two races between 1986 and 1990. However, most of the change was between 1986 and 1987. Relative to white beneficiaries, use rates for black beneficiaries remained unchanged between 1987 and 1990. Females received about one-third more cataract removal/lens implants per 10,000 than did males in 1986, increasing slightly by 1990. The use of cataract removal/lens implants was fairly consistent across urban/rural areas in each of the years 1986 through 1990.

SUMMARY

Physician expenditures represent one of the fastest growing areas of Medicare spending. In 1980, physician payments represented 21.7 percent of total Medicare spending (Helbing, et al 1991) and by 1988 had increased to 26.7 percent. Outlays for physician services are projected to increase to 32.6 percent of total Medicare expenditures by the year 2000 (Sonnefeld, et al, 1991). In the 5-year period 1986 through 1990, allowed charges for Medicare physician services being monitored in this chapter increased by 51 percent, from $19.5 billion to $29.4 billion. The greatest increase was for imaging services, which increased by 60 percent during these years. Within the larger type of service categories, a number of services or procedures showed dramatic increases; there was a 2.5 fold increase in allowed charges for PTCA, arthroscopy and echocardiography more than doubled, and MRI, had a fivefold increase in allowed charges.

The reduction in prices, beginning in 1988, for procedures identified as "overvalued", appeared to slow the rate of growth in total expenditures for many, but not all, of these procedures. Over the entire period 1986 through 1990, allowed charges for these procedures (Table 2) increased at an annual rate of 6.2 percent. Eight overvalued procedures began price reductions in 1988. The increase in allowed charges from 1986 to 1987 for these procedures combined was 14.2 percent. From 1987 through 1990, the increases were 3.6 percent per year. Twelve overvalued procedures began price reductions in 1990. For these procedures, the annual increase in allowed charges from 1986 through 1989, was 7.7 percent. In 1990, as a group, they declined by 0.2 percent, although price cuts could have been as high as 15 percent. This analysis was not designed to assess physician responses to price cuts, but rather was designed to provide estimates in trends of aggregate expenditures. More detailed assessments of these reductions were provided in Chapter 3 and continue to be carried out by HCFA.

The examination of age, sex, race and urban/rural differences in use of services reveals a number of points. First, although there are considerable differences between groups in use rates (younger aged and older aged, males and females, blacks and whites, urban and rural), the differences are not always in the same direction across types of services. For example, generally speaking, blacks use fewer services than do whites and use rates are higher in more urbanized areas than in rural areas. There are exceptions to these patterns such as in-hospital physician visits, where use rates are much higher for black beneficiaries than for white beneficiaries, and knee replacements, where use rates are lowest in the most heavily urbanized areas. Second, the growth in use of services has been fairly consistent across demographic groupings. Therefore, it is reasonable to assume that the relative use rates between groups should continue under Physician Payment Reform. Finally, even with the use of very large demographic groupings, there is sufficient year to year fluctuation in use rates to suggest that caution should be used to avoid over-interpreting short term effects of payment changes.

Next year's Report to Congress will continue the discussion of the trends in use of services illustrated in this year's report. Trend data will be shown for calendar year 1991 and part of 1992. Further exploration of demographic differences in use rates will be shown.

Table 1
Medicare Allowed Charges for Physician Services By Major Type of Service Categories: 1986 to 1990

	(in millions)					Annual Percent Change		Percent Distribution	
	1986	1987	1988	1989	1990	86-90	89-90	1986	1990
Grand Total	$19,499	$22,692	$24,477	$27,177	$29,381	10.8	8.1	100.0	100.0
Visits and Consultations	7,301	8,631	9,226	10,282	11,295	11.5	9.8	37.4	38.4
Procedures	9,595	10,995	11,730	13,028	13,893	9.7	6.6	49.2	47.3
Imaging	2,603	3,066	3,521	3,866	4,194	12.7	8.5	13.3	14.3

Source: HCFA 1986-1990 Part B Medicare Annual Data (BMAD) Beneficiary Files
Taken from Tables produced by the Urban Institute

Table 2
Medicare Allowed Charges for Physician Services
Visits and Consultations: 1986 to 1990

	(in millions)					Annual Percent Change		Percent Distribution	
	1986	1987	1988	1989	1990	86-90	89-90	1986	1990
Total	$7,301	$8,631	$9,226	$10,282	$11,295	11.5	9.8	100.0	100.0
Office Visits	2,545	2,937	3,153	3,531	3,948	11.6	11.8	34.9	35.0
New	289	337	365	409	464	12.6	13.4	4.0	4.1
Established	2,257	2,601	2,788	3,122	3,484	11.5	11.6	30.9	30.8
Hospital	2,516	2,995	3,078	3,406	3,598	9.4	5.6	34.5	31.9
Initial	491	555	562	595	607	5.4	2.0	6.7	5.4
Subsequent	1,751	2,083	2,120	2,337	2,466	8.9	5.5	24.0	21.8
Critical Care	274	358	396	473	524	17.6	10.9	3.8	4.6
Emergency Room	234	288	330	409	469	18.9	14.6	3.2	4.2
Home/Nursing Home	301	344	360	372	415	8.4	11.6	4.1	3.7
Home	53	55	56	55	56	1.8	2.2	0.7	0.5
Nursing Home	248	288	304	316	358	9.6	13.2	3.4	3.2
Specialist Evaluation	860	1,068	1,245	1,444	1,644	17.6	13.8	11.8	14.6
Pathology	271	332	370	431	473	14.9	9.7	3.7	4.2
Psychiatry	161	183	224	270	320	18.6	18.5	2.2	2.8
Ophthalmology	402	518	607	697	797	18.7	14.3	5.5	7.1
Other	25	36	44	46	54	21.2	16.6	0.3	0.5
Consultation	730	869	924	972	1,062	9.8	9.2	10.0	9.4
Chiropractic	115	130	137	149	161	8.7	7.9	1.6	1.4

Source: HCFA 1986–1990 Part B Medicare Annual Data (BMAD) Beneficiary Files
Taken from Tables produced by the Urban Institute

Table 3
Medicare Allowed Charges for Physician Services
Procedures: 1986 to 1990

	(in millions)					Annual Percent Change		Percent Distribution	
	1986	1987	1988	1989	1990	86-90	89-90	1986	1990
Total	$9,595	$10,995	$11,730	$13,028	$13,893	9.7	6.6	100.0	100.0
Major Procedure: General	1,410	1,539	1,564	1,638	1,630	3.7	-0.5	14.7	11.7
Breast	58	67	73	70	68	4.3	-2.8	0.6	0.5
*Colectomy	156	171	171	184	175	2.9	-4.9	1.6	1.3
*Cholecystectomy	136	149	148	142	134	-0.5	-5.8	1.4	1.0
**TURP	254	286	263	257	234	-2.1	-9.2	2.6	1.7
*Hysterectomy	53	61	61	57	41	-6.0	-26.9	0.6	0.3
*Disk Surgery	79	89	106	123	143	16.0	16.1	0.8	1.0
Other	674	717	743	805	835	5.5	3.8	7.0	6.0
Major Procedure: Cardiovascular	1,150	1,364	1,452	1,590	1,673	9.8	5.2	12.0	12.0
**CABG	380	460	495	530	540	9.2	2.0	4.0	3.9
*Aneurysm	69	78	81	85	77	2.5	-10.2	0.7	0.6
*Thromboendarerectomy	88	93	88	83	72	-4.8	-13.5	0.9	0.5
PTCA	44	82	107	118	152	36.5	28.3	0.5	1.1
**Pacemaker	116	126	123	129	124	1.8	-3.3	1.2	0.9
Other	454	525	558	646	708	11.8	9.7	4.7	5.1
Major Procedure: Orthopedic	720	806	827	880	931	6.6	5.8	7.5	6.7
Hip fracture Repair	190	206	195	200	215	3.1	7.4	2.0	1.5
**Hip Replacement	207	239	239	239	216	1.0	-9.6	2.2	1.6
**Knee revision	143	165	178	194	225	12.1	16.0	1.5	1.6
Other	180	196	216	247	275	11.2	11.4	1.9	2.0

*Procedure identified as "overvalued" and subject to price reductions beginning in 1990.

**Procedure identified as "overvalued" and subject to price reductions beginning in 1988 and 1990.

Table 3 (Cont.)
Medicare Allowed Charges for Physician Services
Procedures: 1986 to 1990

	(in millions)					Annual Percent Change		Percent Distribution	
	1986	1987	1988	1989	1990	86-90	89-90	1986	1990
Major Procedures: Eyes	1,966	2,247	2,442	2,678	2,886	10.1	7.7	20.5	20.8
Corneal Transplant	32	35	38	42	45	9.0	7.4	0.3	0.3
***Cat Rem/Lens Insert	1,455	1,629	1,690	1,773	1,875	6.5	5.7	15.2	13.5
Retinal Detachment	51	56	63	67	67	6.9	-0.2	0.5	0.5
*Treatm Retinal Lesions	89	118	138	161	169	17.4	4.9	0.9	1.2
***Other	339	410	513	635	730	21.2	14.9	3.5	5.3
Ambulatory Procedures:	792	918	971	1,082	1,160	10.0	7.3	8.3	8.4
Skin	296	343	364	410	453	11.2	10.4	3.1	3.3
Musculoskeletal	148	164	170	181	185	5.8	2.4	1.5	1.3
*Hernia Repair	73	80	81	86	83	3.5	-3.6	0.8	0.6
*Lithotripsy	9	16	18	20	21	23.2	5.6	0.1	0.2
Other	266	315	338	385	418	12.0	8.7	2.8	3.0
Minor Procedures:	634	749	859	1,006	1,184	16.9	17.6	6.6	8.5
Skin	310	367	416	488	569	16.4	16.8	3.2	4.1
Musculoskeletal	115	126	137	153	171	10.4	12.1	1.2	1.2
##Other	209	257	307	366	443	20.7	21.0	2.2	3.2
Oncology	339	418	461	549	612	15.9	11.5	3.5	4.4
Rad therapy	289	355	392	480	519	15.8	8.1	3.0	3.7
Other	50	63	69	69	94	16.9	35.4	0.5	0.7

*Procedure identified as "overvalued" and subject to price reductions beginning in 1990.

*** Procedure identified as "overvalued" and subject to price reductions beginning in 1987, 1988 and 1990.

##Includes some services not included in the Medicare Fee Schedule

Table 3 (Cont.)
Medicare Allowed Charges for Physician Services
Procedures: 1986 to 1990

	(in millions)					Annual Percent Change		Percent Distribution	
	1986	1987	1988	1989	1990	86-90	89-90	1986	1990
Endoscopy	918	1,111	1,210	1,376	1,476	12.6	7.2	9.6	10.6
**Arthroscopy	29	46	51	59	66	22.6	11.1	0.3	0.5
Upper GI endo	242	299	322	360	397	13.2	10.0	2.5	2.9
Sigmoidoscopy	72	135	110	114	116	12.8	2.4	0.7	0.8
*Colonoscopy	309	328	395	472	485	11.9	2.6	3.2	3.5
Cystoscopy	161	185	201	224	244	10.8	8.9	1.7	1.8
**Bronchoscopy	65	74	79	85	87	7.6	3.3	0.7	0.6
Laparoscopic Cholecystectomy	3	3	3	2	4	15.2	193.3	0.0	0.0
Laryngoscopy	21	26	29	33	38	16.0	15.2	0.2	0.3
Other	17	17	21	28	39	22.5	37.0	0.2	0.3
Tests	658	780	831	905	940	9.3	3.9	6.9	6.8
Electrocardiograms	465	541	560	617	613	7.2	-0.6	4.8	4.4
*Cardiov Stress Tests	72	91	106	126	139	17.9	10.2	0.8	1.0
*EKG Monitoring	121	148	164	161	187	11.5	16.4	1.3	1.3
Anesthesia	1,009	1,063	1,113	1,324	1,402	8.6	5.9	10.5	10.1

* Procedure identified as "overvalued" and subject to price reductions beginning in 1990.

** Procedure identified as "overvalued" and subject to price reductions beginning in 1988 and 1990.

##Includes some services not included in the Medicare Fee Schedule

Source: HCFA 1986-1990 Part B Medicare Annual Data (BMAD) Beneficiary Files
Taken from Tables produced by the Urban Institute

Note: Assistance at surgery is not considered a separate type of service. For example, assistance at surgery for CABG is included withing the CABG type of service. Furture reports will show charges within type of service category due to assistance at surgery.

Table 4
Medicare Allowed Charges for Physician Services
Imaging: 1986 to 1990

	(in millions)					Annual Percent Change		Percent Distribution	
	1986	1987	1988	1989	1990	86-90	89-90	1986	1990
Total	$2,603	$3,066	$3,521	$3,866	$4,194	12.7	8.5	100.0	100.0
Standard Imaging	1,312	1,465	1,591	1,736	1,781	7.9	2.6	50.4	42.5
Chest	422	474	498	553	564	7.5	2.0	16.2	13.5
Musculoskeletal	340	382	401	421	423	5.7	0.6	13.0	10.1
Breast	63	95	127	143	164	27.2	14.5	2.4	3.9
GI Tract	154	157	152	182	185	4.8	1.9	5.9	4.4
Nuclear Medicine	184	195	248	262	277	10.8	5.8	7.0	6.6
Other	151	163	165	176	168	2.7	-4.4	5.8	4.0
Advanced Imaging	435	582	713	764	836	17.8	9.4	16.7	19.9
CT-Head	186	219	234	211	196	1.4	-7.1	7.1	4.7
CT-Other	211	278	334	367	399	17.2	8.5	8.1	9.5
MRI-Brain	22	45	70	90	106	48.3	18.2	0.8	2.5
MRI-Other	16	40	75	96	135	70.9	40.9	0.6	3.2
Sonography	486	574	703	798	954	18.4	19.6	18.7	22.8
Echo-Eye	122	136	113	101	100	-4.8	-1.3	4.7	2.4
*Echo- Abdomen/Pelvis	109	122	150	174	188	14.6	7.8	4.2	4.5
Echo-Heart	184	219	309	363	483	27.3	33.0	7.1	11.5
Echo-Carotid Arteries	53	75	89	108	122	23.0	13.0	2.1	2.9
Echo-Prostate, Transrectal	2	3	2	5	17	78.3	224.5	0.1	0.4
Echography-Other	17	18	39	46	44	27.7	-3.9	0.6	1.1
Imaging/Procedure	370	445	514	568	622	13.9	9.5	14.2	14.8
Procedure, Incl Card Cath	210	274	329	379	435	20.0	14.8	8.0	10.4
Proc Other	160	171	184	189	187	3.9	-1.0	6.2	4.5

*Procedure identified as "overvalued" and subject to price reductions beginning in 1990.

Source: HCFA 1986-1990 Part B Medicare Annual Data (BMAD) Beneficiary Files
Taken from tables produced by the Urban Institute

Table 5
Services per 10,000 Medicare Beneficiaries: 1990
Selected Visit and Consultation Services

Demographic Characteristic	Office Visits Established		Hospital Visits Established		Opththalmology		Consultations	
All Persons	42,739	(Rel Use)	23,951	(Rel Use)	6,263	(Rel Use)	3,939	(Rel Use)
Age								
0-44	23,485	(0.70)	18,347	(1.41)	1,188	(0.28)	2,889	(1.11)
45-54	31,596	(0.94)	20,725	(1.59)	1,802	(0.43)	3,443	(1.32)
55-64	22,602	(0.67)	15,377	(1.18)	1,645	(0.39)	2,414	(0.93)
65-69	33,547	(1.00)	13,039	(1.00)	4,210	(1.00)	2,604	(1.00)
70-74	46,401	(1.38)	20,728	(1.59)	6,670	(1.58)	3,821	(1.47)
75-79	52,876	(1.58)	28,573	(2.19)	8,471	(2.01)	4,746	(1.82)
80-84	54,373	(1.62)	37,013	(2.84)	9,432	(2.24)	5,513	(2.12)
85+	47,507	(1.42)	50,343	(3.86)	8,542	(2.03)	6,359	(2.44)
Race								
White	43,069	(1.00)	23,622	(1.00)	6,318	(1.00)	3,933	(1.00)
Black	38,800	(0.90)	30,940	(1.31)	5,409	(0.86)	4,329	(1.10)
Other	41,583	(0.97)	18,419	(0.78)	4,941	(0.78)	3,321	(0.84)
Unknown	27,841	(0.65)	17,528	(0.74)	3,944	(0.62)	2,885	(0.73)
Sex								
Male	38,864	(1.00)	24,570	(1.00)	5,223	(1.00)	4,159	(1.00)
Female	44,610	(1.15)	23,449	(0.95)	6,785	(1.30)	3,748	(0.90)

Table 5 (Cont.)
Services per 10,000 Medicare Beneficiaries: 1990
Selected Visit and Consultation Services

Demographic Characteristic	Office Visits Established		Hospital Visits Established		Opththalmology		Consultations	
All Persons	42,739	(Rel Use)	23,951	(Rel Use)	6,263	(Rel Use)	3,939	(Rel Use)
Area								
Very Rural	37,156	(0.78)	17,965	(0.63)	4,994	(0.62)	2,365	(0.44)
Rural	40,053	(0.84)	21,037	(0.73)	5,122	(0.63)	3,026	(0.56)
MSA-Small	38,799	(0.81)	21,290	(0.74)	5,369	(0.66)	3,191	(0.59)
MSA-Medium	41,831	(0.87)	24,011	(0.84)	5,734	(0.71)	3,611	(0.66)
MSA-Large	41,601	(0.87)	24,837	(0.87)	5,925	(0.73)	4,305	(0.79)
MSA-Very Large	47,825	(1.00)	28,672	(1.00)	8,080	(1.00)	5,435	(1.00)

Note: Data are unadjusted for differences in age or sex.

Source: HCFA 1986–1990 Part B Medicare Annual Data (BMAD) Beneficiary Files
Taken from tables produced by the Urban Institute

Table 6
Services per 10,000 Medicare Beneficiaries: 1990
Selected Procedures

	TURP (male)		CABG		PTCA		Knee Replacement		Cataract Removal Lens Implant		Endoscopy			
											Upper GI		Colonoscopy	
All Persons	173	(Rel Use)	43	(Rel Use)	35	(Rel Use)	29	(Rel Use)	480	(Rel Use)	385	(Rel Use)	340	(Rel Use)
0-44	3	(0.03)	3	(0.07)	7	(0.18)	2	(0.09)	29	(0.12)	283	(1.01)	86	(0.30)
45-54	14	(0.12)	22	(0.49)	31	(0.82)	11	(0.48)	73	(0.29)	346	(1.24)	150	(0.53)
55-64	35	(0.30)	33	(0.73)	25	(0.66)	11	(0.48)	92	(0.37)	251	(0.90)	144	(0.51)
65-69	117	(1.00)	45	(1.00)	38	(1.00)	23	(1.00)	248	(1.00)	279	(1.00)	283	(1.00)
70-74	205	(1.75)	58	(1.29)	46	(1.21)	38	(1.65)	457	(1.84)	384	(1.38)	391	(1.38)
75-79	268	(2.29)	55	(1.22)	42	(1.11)	40	(1.74)	722	(2.91)	471	(1.69)	436	(1.54)
80-84	307	(2.63)	30	(0.67)	26	(0.68)	36	(1.57)	875	(3.53)	509	(1.82)	414	(1.46)
85+	304	(2.60)	7	(0.16)	10	(0.26)	18	(0.78)	765	(3.08)	525	(1.88)	329	(1.16)
Race														
White	186	(1.00)	45	(1.00)	37	(1.00)	30	(1.00)	491	(1.00)	387	(1.00)	345	(1.00)
Black	150	(0.81)	12	(0.27)	13	(0.35)	19	(0.63)	353	(0.72)	400	(1.03)	281	(0.81)
Other	113	(0.61)	27	(0.60)	29	(0.78)	14	(0.47)	396	(0.81)	379	(0.98)	246	(0.71)
Unknown	196	(1.05)	34	(0.76)	26	(0.70)	21	(0.70)	272	(0.55)	253	(0.65)	236	(0.68)
Sex														
Male	173	----	68	(1.00)	48	(1.00)	23	(1.00)	386	(1.00)	408	(1.00)	367	(1.00)
Female	----	----	23	(0.34)	25	(0.52)	33	(1.43)	531	(1.38)	366	(0.90)	310	(0.84)

Table 6 (Cont.)
Services per 10,000 Medicare Beneficiaries: 1990
Selected Procedures

	TURP (male)		CABG		PTCA		Knee Replacement		Cataract Removal Lens Implant		Endoscopy			
											Upper GI		Colonoscopy	
All Persons	173	(Rel Use)	43	(Rel Use)	35	(Rel Use)	29	(Rel Use)	480	(Rel Use)	385	(Rel Use)	340	(Rel Use)
Area														
Very Rural	188	(1.09)	38	(0.97)	34	(1.03)	34	(1.55)	458	(1.04)	315	(0.83)	260	(0.71)
Rural	178	(1.03)	43	(1.10)	32	(0.97)	29	(1.32)	426	(0.97)	369	(0.97)	296	(0.81)
MSA-Small	191	(1.10)	46	(1.18)	31	(0.94)	35	(1.59)	485	(1.10)	385	(1.01)	314	(0.86)
MSA-Medium	186	(1.07)	45	(1.15)	37	(1.12)	28	(1.27)	506	(1.15)	391	(1.03)	343	(0.94)
MSA-Large	183	(1.06)	42	(1.08)	39	(1.18)	33	(1.50)	524	(1.19)	434	(1.14)	369	(1.01)
MSA-Very Lar	173	(1.00)	39	(1.00)	33	(1.00)	22	(1.00)	441	(1.00)	380	(1.00)	366	(1.00)

Source: HCFA 1986-1990 Part B Medicare Annual Data (BMAD) Beneficiary Files
Taken from tables produced by the Urban Institute

Table 7
Services per 10,000 Medicare Beneficiaries: 1990
Selected Imaging

	Standard Imaging				Advanced Imaging				Echography		Cardiac	
	Chest		Breast (Female)		CT- Other		MRI - Other		Heart		Catheterization	
All Persons	9,932	(Rel Use)	1,825	(Rel Use)	1,080	(Rel Use)	140	(Rel Use)	1,309	(Rel Use)	229	(Rel Use)
Age												
0-44	4,988	(0.77)	668	(0.29)	489	(0.55)	142	(1.02)	506	(0.58)	62	(0.25)
45-54	7,539	(1.16)	1,529	(0.66)	798	(0.90)	197	(1.42)	888	(1.01)	225	(0.92)
55-64	5,907	(0.91)	944	(0.41)	648	(0.73)	119	(0.86)	748	(0.85)	203	(0.83)
65-69	6,516	(1.00)	2,301	(1.00)	883	(1.00)	139	(1.00)	876	(1.00)	244	(1.00)
70-74	9,541	(1.46)	2,462	(1.07)	1,198	(1.36)	163	(1.17)	1,336	(1.53)	300	(1.23)
75-79	11,841	(1.82)	1,990	(0.86)	1,335	(1.51)	157	(1.13)	1,667	(1.90)	269	(1.10)
80-84	13,974	(2.14)	1,372	(0.60)	1,301	(1.47)	123	(0.88)	1,883	(2.15)	159	(0.65)
85+	17,581	(2.70)	661	(0.29)	1,095	(1.24)	67	(0.48)	1,872	(2.14)	56	(0.23)
Race												
White	9,942	(1.00)	1,894	(1.00)	1,086	(1.00)	144	(1.00)	1,299	(1.00)	237	(1.00)
Black	10,704	(1.08)	1,203	(0.64)	1,066	(0.98)	113	(0.78)	1,477	(1.14)	140	(0.59)
Other	7,535	(0.76)	1,334	(0.70)	818	(0.75)	125	(0.87)	1,038	(0.80)	198	(0.84)
Unknown	6,847	(0.69)	787	(0.42)	729	(0.67)	103	(0.72)	920	(0.71)	155	(0.65)
Sex												
Male	10,626	(1.00)	---	---	1,162	(1.00)	144	(1.00)	1,379	(1.00)	308	(1.00)
Female	9,299	(0.88)	1,825	---	999	(0.86)	136	(0.94)	1,237	(0.90)	167	(0.54)

Table 7 (Cont.)
Services per 10,000 Medicare Beneficiaries: 1990
Selected Imaging

	Standard Imaging				Advanced Imaging				Echography		Cardiac	
	Chest		Breast (Female)		CT- Other		MRI - Other		Heart		Catheterization	
All Persons	9,932	(Rel Use)	1,825	(Rel Use)	1,080	(Rel Use)	140	(Rel Use)	1,309	(Rel Use)	229	(Rel Use)
Area												
Very Rural	8,355	(0.77)	1,238	(0.62)	806	(0.67)	92	(0.52)	824	(0.50)	193	(0.84)
Rural	9,242	(0.85)	1,535	(0.77)	946	(0.79)	101	(0.57)	1,141	(0.69)	215	(0.93)
MSA-Small	9,227	(0.85)	1.743	(0.87)	1,036	(0.87)	141	(0.80)	1,160	(0.70)	225	(0.97)
MSA-Mediu	9,699	(0.89)	1,927	(0.96)	1,094	(0.91)	142	(0.81)	1,261	(0.76)	242	(1.05)
MSA-Large	10,376	(0.95)	1,932	(0.97)	1,146	(0.96)	151	(0.86)	1,321	(0.80)	231	(1.00)
MSA-Very	10,876	(1.00)	2,002	(1.00)	1,196	(1.00)	176	(1.00)	1,654	(1.00)	231	(1.00)

Source: HCFA 1986–1990 Part B Medicare Annual Data (BMAD) Beneficiary Files
Taken from tables produced by the Urban Institute

Table 8
Services per 10,000 Persons: 1986 to 1990
Office Visits: Established

						Annual Percent Change	Relative Use		
	1986	1987	1988	1989	1990	86-90	1986	1988	1990
All Persons	36,309	37,977	38,862	41,144	42,739	4.2	----	----	----
Age									
0-44	21,588	21,983	21,787	22,812	23,485	2.1	0.76	0.71	0.70
45-54	31,013	31,167	30,502	31,004	31,596	0.5	1.09	0.99	0.94
55-64	21,635	21,700	20,842	22,877	22,602	1.1	0.76	0.68	0.67
65-69	28,516	29,801	30,757	33,457	33,547	4.1	1.00	1.00	1.00
70-74	39,612	41,098	42,231	43,494	46,401	4.0	1.39	1.37	1.38
75-79	44,598	47,070	47,908	50,741	52,876	4.3	1.56	1.56	1.58
80-84	45,930	48,292	49,471	52,125	54,373	4.3	1.61	1.61	1.62
85+	38,070	40,601	41,904	44,881	47,507	5.7	1.34	1.36	1.42
Race									
White	36,356	38,085	39,497	41,376	43,069	4.3	1.00	1.00	1.00
Black	34,279	35,224	35,249	37,989	38,800	3.1	0.94	0.89	0.90
Other	38,578	39,144	39,581	40,580	41,583	1.9	1.06	1.00	0.97
Unknown	21,717	23,864	11,219	26,261	27,841	6.4	0.60	0.28	0.65
Sex									
Male	32,906	34,419	34,693	37,311	38,864	4.2	1.00	1.00	1.00
Female	37,876	39,610	40,896	42,993	44,610	4.2	1.15	1.18	1.15

Table 8 (Cont.)
Services per 10,000 Persons: 1986 to 1990
Office Visits: Established

	1986	1987	1988	1989	1990	Annual Percent Change 86–90	Relative Use		
							1986	1988	1990
All Persons	36,309	37,977	38,862	41,144	42,739	4.2	----	----	----
Area									
Very Rural	34,034	36,012	37,060	38,751	37,156	2.2	0.82	0.86	0.78
Rural	33,156	35,157	36,189	38,467	40,053	4.8	0.80	0.84	0.84
MSA-Small	32,237	34,292	35,044	37,348	38,799	4.7	0.77	0.81	0.81
MSA-Medium	34,403	36,542	37,356	39,886	41,831	5.0	0.83	0.86	0.87
MSA-Large	34,229	36,141	36,716	38,053	41,601	5.0	0.82	0.85	0.87
MSA-Very Large	41,662	42,312	43,330	46,506	47,825	3.5	1.00	1.00	1.00

Source: HCFA 1986–1990 Part B Medicare Annual Data (BMAD) Beneficiaries Files
Taken from the tables produced by the Urban Institute

Table 9
Services per 10,000 Persons: 1986 to 1990
Major Procedure: Cataract Removal/Lens Implant

						Annual Percent Change		Relative Use	
	1986	1987	1988	1989	1990	86–90	1986	1988	1990
All Persons	342	381	408	454	480	8.8	----	----	----
Age									
0-44	24	21	27	35	29	4.8	0.14	0.13	0.12
45-54	50	68	59	70	73	9.9	0.29	0.29	0.29
55-64	69	78	79	93	92	7.5	0.40	0.39	0.37
65-69	174	188	203	237	248	9.3	1.00	1.00	1.00
70-74	319	346	385	432	457	9.4	1.83	1.90	1.84
75-79	508	570	610	670	722	9.2	2.92	3.00	2.91
80-84	639	723	759	828	875	8.2	3.67	3.74	3.53
85+	565	650	674	738	765	7.9	3.25	3.32	3.08
Race									
White	347	385	418	461	491	9.1	1.00	1.00	1.00
Black	231	281	313	342	353	11.2	0.67	0.75	0.72
Other	290	325	332	424	696	24.5	0.84	0.79	1.42
Unknown	197	222	101	247	272	8.4	0.57	0.24	0.55
Sex									
Male	278	304	323	363	386	8.6	1.00	1.00	1.00
Female	370	418	451	502	531	9.5	1.33	1.40	1.38

Table 9 (Cont.)
Services per 10,000 Persons: 1986 to 1990
Major Procedure: Cataract Removal/Lens Implant

	1986	1987	1988	1989	1990	Annual Percent Change 86-90	Relative Use 1986	Relative Use 1988	Relative Use 1990
All Persons	342	381	408	454	480	8.8	----	----	----
Area									
Very Rural	316	363	390	443	458	9.7	0.97	0.97	1.01
Rural	311	342	383	405	426	8.2	0.95	0.91	0.99
MSA-Small	314	386	403	453	485	11.5	0.96	1.03	1.04
MSA-Medium	345	383	404	477	506	10.0	1.06	1.02	1.05
MSA-Large	366	380	427	482	524	9.4	1.12	1.02	1.11
MSA-Very Large	327	374	386	420	441	7.8	1.00	1.00	1.00

Source: HCFA 1986-1990 Part B Medicare Annual Data (BMAD) Beneficiary Files
Taken from tables produced by the Urban Institute

CHAPTER 5

Use and access to Medicare inpatient hospital services, 1986-90

INTRODUCTION

Background

HCFA will monitor trends in hospitalizations for specific medical conditions and surgical procedures to complement the information obtained from monitoring Part B claims data. Analysis of hospitalization information from before, during and after physician payment reform may help identify changes in access to certain physician services or changes unrelated to access but to other characteristics of the health care system.

For some medical conditions, hospitalization can serve as a sentinel event that could indicate a lack of access to outpatient care or failure to properly manage a patient in an ambulatory setting. As an example, diabetic ketoacidosis is a serious medical condition requiring hospitalization that is largely avoidable if diabetic patients have adequate access to physicians' services in the outpatient setting and if physicians manage and treat diabetic patients appropriately. If there is a change in hospitalization trends for diabetic ketoacidosis, then it will be important to conduct additional studies to understand the changing trends. In addition to sentinel conditions, there are other medical conditions that are important to monitor because of the high rates of incidence or prevalence in the elderly Medicare population.

Changes in rates of hospitalization for specific surgical procedures will be monitored as well. Admission for surgical procedures such as CABG and hip replacement are usually arranged via referral from primary care physicians to specialists, who are the ultimate decisionmakers regarding patients selected for these procedures. Changes in the trends for surgical procedures could suggest that problems exist in obtaining access to these services. It must be kept in mind that such information would not provide conclusive evidence about causality but would highlight areas that require more indepth analyses to ascertain why a change occurred.

In addition to these clinically and epidemiologically based reasons for including hospitalization in monitoring access, Part A data do not have the same limitations of duplicate records and coding variability between Medicare carriers found in Part B data (see Chapter 4). For example, hospital data do not suffer from the problems of completeness that were present in BMAD's early years. In addition, for the baseline period, Part B physician procedure data from BMAD are available only for a 5 percent sample, while Part A hospital data are available on virtually a 100 percent basis[1]. Thus, Part A data provide more accurate information to analyze trends in the rate of inpatient procedures than do the Part B files. Furthermore, in contrast to the lack of uniformity of the codes used in Part B data during the baseline period, procedures and conditions in Part A data are defined by specific ICD-9-CM codes.

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[1] Hospitalization data for Medicare beneficiaries enrolled in HMOs are not complete.

Trends in hospitalizations will be monitored in particular for certain vulnerable groups that might be impacted differently by the implementation of the new physician payment system. Hospital data from the period before physician payment reform might be used to identify trends for these vulnerable groups in order to compare baseline trends with those following payment reform. It should be observed that understanding changes in utilization levels is limited by a lack of information about need for services. Yet for most conditions and procedures, data on utilization are all that are available.

Another useful measure to monitor is the 30-day post-admission mortality rate. This measure complements the hospital admission rate for selected conditions and procedures and provides a more complete picture of any observed changes in patterns of hospital utilization. Thirty day post-admission mortality rates have been used as indicators of both the quality of care and the severity of illness in the mix of patients admitted for treatment. Because the analyses presented here are not hospital, but population based and focus on selected conditions and procedures, changes in the 30-day post-admission mortality rates are more likely to reflect changes in the severity of illness of the patients hospitalized for a particular condition.

It should be observed that the absolute values of these measures will not be the focus in monitoring hospital utilization and outcomes. It is already known that differences in hospital utilization and outcomes exist for certain vulnerable groups. Rather, the monitoring of trends in hospitalization will focus on identifying any changes in the relationships of utilization and outcomes across groups. Understanding any observed changes in hospital utilization and outcomes is likely to require analysis of other data as well as changes in system-wide characteristics to provide a more complete understanding of evolving trends.

Selection of Procedures and Conditions to be Monitored

Administrative data are available for nearly 100 percent of Medicare hospitalizations, totaling almost 10 million per year. The potential exists to monitor literally hundreds of procedures and medical diagnoses. These procedures and diagnoses could be studied individually or they could be clustered in several different ways; for example, by body system (nervous system, respiratory system, etc.), by organ (brain, lungs, etc.), by specialty of the usual provider (neurologist, pulmonary physician, etc.) or by pathology (dementia, acute infection, etc.).

For this report to Congress, baseline Part A data were assembled on admissions for 23 surgical procedures and 29 medical conditions for the period 1986-90. This list, shown in Appendix B of this report, is exploratory and can be adjusted as needed. Indepth analyses of 5 of the 29 conditions and 5 of the 23 procedures are presented in this report.

The 23 surgical procedures to be monitored reflect one of the following categories: 1) procedures with stable discharge rates between 1986 and 1990;[2] 2) procedures that experienced modest to major increases in the rates of procedures during the second half of the 1980s; 3) procedures undergoing changes in the method of clinical treatment; and 4) procedures that have an alternative procedure available as a treatment option. Payment for several of the procedures on this list were reduced between 1988 and 1990 as overpriced procedures (see Appendix C).

Included in the category of procedures with stable discharge rates were partial excision of the large bowel, prostatectomy, hysterectomy, reduction of fracture of the femur, other arthroplasty of the hip, mastectomy, appendectomy and incidental appendectomy. Changes in discharge rates for these procedures following implementation of payment reform might be considered more important from the perspective of the Medicare beneficiaries because of the stability in the discharge rates during the period prior to payment reform.

Included in the category of procedures that experienced modest to major increases during the 1980s were percutaneous transluminal coronary angioplasty, coronary artery bypass graft, total knee replacement, total hip replacement, cardiac catheterization, permanent cardiac pacemaker implantation and carotid endarterectomy. Monitoring discharge rates and 30-day post-admission mortality rates for these procedures may be more challenging because of the difficulty in distinguishing between secular trends (including technology diffusion), overpriced procedure reductions, and the effect of payment reform.

In the category of procedures undergoing changes in the method of surgical treatment, cholecystectomy was chosen because of issues it brings into consideration. For persons with gall bladder disease, laparoscopic cholecystectomy is a relatively new method of removing the gall bladder that may be less traumatic to the patient and less costly to perform. This procedure is rapidly replacing the traditional method of cholecystectomy. Laparoscopic cholecystectomy has resulted in a marked reduction in the length of hospital stay and eventually may be performed in hospital outpatient or ambulatory surgical centers.

Examples of conditions for which there are alternative procedures for treatment include coronary artery disease and back pain. Alternative procedures for coronary artery disease are CABG and PTCA; for back pain alternatives include laminectomy, excision of disc, and spinal fusion. Changes in trends in use and access of the alternative procedures across population groups, especially for vulnerable groups, can be monitored.

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[2] Discharge rates are used rather than admission rates because the MEDPAR file for any given year contains all hospital discharges for that year, not all admissions.

The criteria for selecting the 29 medical conditions to be monitored were: 1) sentinel conditions; and 2) chronic medical conditions with high rates of incidence or prevalence in the elderly Medicare population.

Rutstein and colleagues have discussed diabetic ketoacidosis and asthma as two sentinel conditions for which hospitalizations could serve as indicators of access to medical care in the outpatient setting (Rutstein et al). For monitoring physician payment reform, these two conditions were selected as well as hospitalization for hypertension and congestive heart failure, which can also serve as indicators of access to medical care in the ambulatory setting.

Chronic conditions with high rates of incidence and prevalence in the elderly such as ischemic heart disease, acute myocardial infarction, transient ischemic attacks, stroke, pneumonia and influenza, septicemia, and the various forms of chronic obstructive pulmonary disease will be monitored. These are conditions for which the underlying disease and pathology may be the primary determinant of hospitalization. For pneumonia and influenza, which cause 5 percent of hospitalizations, the impact of changes in the type of influenza organism from year to year will make comparisons in overall trends difficult, but examining changes in trends across demographic and geographic groups will be informative.

In addition, data for six major types of cancer have been developed. Four of the six cancers (breast, cervix, colorectal and prostate) have screening tests available. Two of these, mammography and Pap smear, are recommended by essentially all health groups and are now paid for by Medicare beginning in January 1991. Part A data on surgical interventions, complemented by Part B data on screening tests, can be used to determine the relationship of the use of screening tests and surgical interventions for cancer.

From the 23 procedures and 29 conditions for which we have assembled data for the period 1986-90, five procedures and five conditions were selected for inclusion in this report. The five medical conditions are: diabetic ketoacidosis, hypertension, congestive heart failure, asthma and transient ischemic attack. The five procedures are: PTCA, CABG, total knee replacement, prostatectomy, and mastectomy. These examples are provided to illustrate how information about hospital use obtained from Medicare data can be used to monitor changes. Only selected findings from the analysis of the five conditions and procedures are presented in this chapter. A full discussion of each of the five conditions and procedures is provided in Appendix C.

ANALYTIC APPROACH

Discharge rates and 30-day post-admission mortality rates are analyzed by race-sex groups, age groups, and geographic area. The race-sex groups are white males, white females, black males and black females. The age groups are ages 65-74, 75-84 and 85-99. Geographic areas are defined by whether the Medicare beneficiary resided within or outside of a MSA. In this analysis of hospitalizations, vulnerable groups considered are black persons, the oldest elderly, and persons residing in rural areas.

For this analysis, trends in discharge rates and 30-day post-admission mortality rates after January 1, 1992 will be compared with the trends of the previous years. Simple time trend regression equations for each of these measures were estimated for the period 1986 through 1990. The slope of the regression equation will be used to indicate if the trend in the rate increased, decreased or remained the same over the five year period. In this way, any changes that occur in the trends for the different demographic and geographic groups can be compared. Once data are available for the period after January 1, 1992, the relationship of the new rates to the previous program experience will be measured.

OVERVIEW OF THE RESULTS

As noted, examples have been selected to illustrate the use of these data, each representing a different procedure or medical condition. The first example uses total knee replacement and shows rates by four race-sex groups. As shown in Figure 1, during the 5 year baseline period, hospital discharge rates in the United States for total knee replacement increased significantly for all four groups; men, however, were much less likely to have the procedure. The trends for each group were essentially the same (that is, statistical tests showed no significant difference in the slopes of the equations fitted to the rates) indicating that the differences between the discharge rates for the four groups have been stable over the 1986-1990 period. Future observations will be added to determine if trends in the rate of total knee replacement are consistent with previous patterns or if they have changed.

Figure 2 shows the 30-day post-admission mortality rates following total knee replacement by race-sex groups. There was a large amount of instability in the 30-day post-admission mortality rates. The variability in these rates suggests the difficulty of using this measure in monitoring total knee replacement.

Figure 1. Total Knee Replacement
Discharge Rates for Medicare Beneficiaries
65 Years of Age and Older, by Race and Sex, U.S., 1986–90

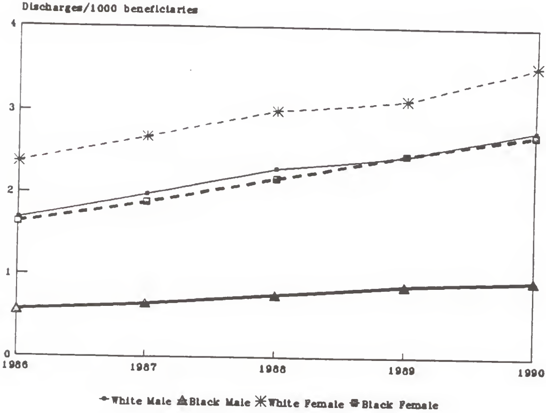
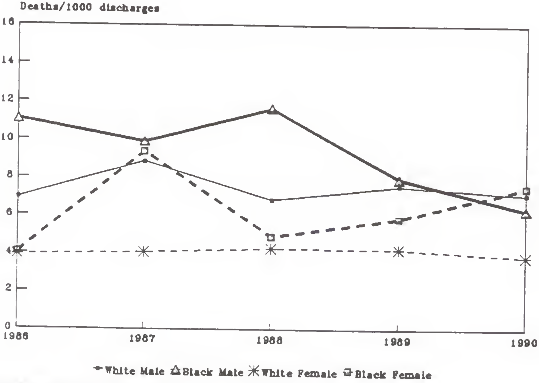


Figure 2. Total Knee Replacement
30–Day Post–Admission Mortality Rates for Medicare Beneficiaries
65 Years of Age and Older, by Race and Sex, U.S., 1986–90



Figures 3 and 4 present information on mastectomy for three age categories. The 5 year trends in the discharge rates are again similar; over time the discharge rates for each of the three age groups have remained relatively stable. In 1991, Medicare coverage was extended to pay for a screening mammography every 2 years for female beneficiaries. With increased mammography, the number of mastectomies is also likely to increase, which will make the interpretation of future secular trends more difficult. However, mammograms paid for by Medicare will be monitored and information about mammograms will be included in future analyses.

The 30-day post-admission mortality rates for women 85 years of age and older following mastectomy have decreased significantly during the 5 year period.

Figures 5 and 6 are for CABG and illustrate rates for MSA and non-MSA residents. Figure 5 shows that MSA and rural residents had similar discharge rates over the 5 year period. The trend in discharge rates has been essentially flat. Any change in this relationship that occurs after the implementation of physician payment reform will be important to understand. Figure 6 indicates that the 30-day post-admission mortality rates has been decreasing for MSA and rural residents.

The next three examples are for medical conditions. Figures 7 and 8 show rates of hospitalization for hypertension for four race-sex groups. During the 5 year period, discharge rates have been decreasing for all four groups. The rates for black women decreased faster than the rates for white men. Rates of hospitalization for hypertension will be monitored to determine if the trend for all race-sex groups continues. There was a significantly decreasing trend in the rate of 30-day post-admission mortality for hypertension for white women.

Figures 9 and 10 show rates for congestive heart failure (CHF) for three age groups. Throughout the 5 year period, 1986-90, discharge rates for the oldest old were approximately fourfold greater than those of the youngest age group. The stability of the relationship of rates between age groups throughout the 1986-1990 period make CHF an important condition to monitor. Also, because of the large number of persons admitted with CHF, it will be possible to monitor subsets of the demographic or geographic groups shown, for example, by smaller age groups or by States.

The 30-day post-admission mortality rates for CHF decreased significantly for all three age groups during the 5 year period. The rate of decrease in the oldest old was greater than that in the youngest age group.

Figure 3. Mastectomy
Discharge Rates for Medicare Beneficiaries
65 Years of Age and Older, by Age, U.S., 1986-90

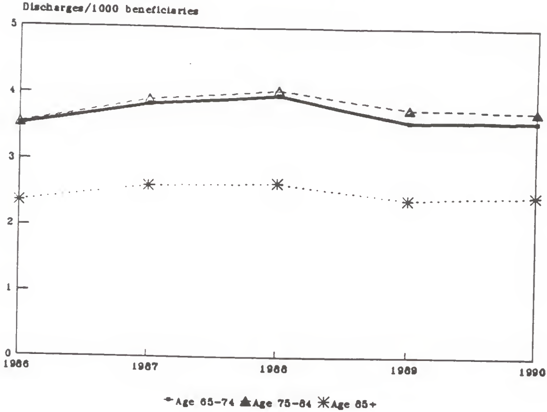


Figure 4. Mastectomy
30-Day Post-Admission Mortality Rates for Medicare Beneficiaries
65 Years of Age and Older, by Age, U.S., 1986-90

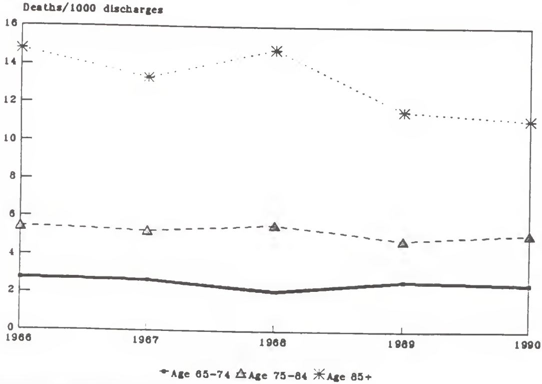


Figure 5. Coronary Artery Bypass Graft
Discharge Rates for Medicare Beneficiaries
65 Years of Age and Older, by Geographic Area, U.S., 1986-90

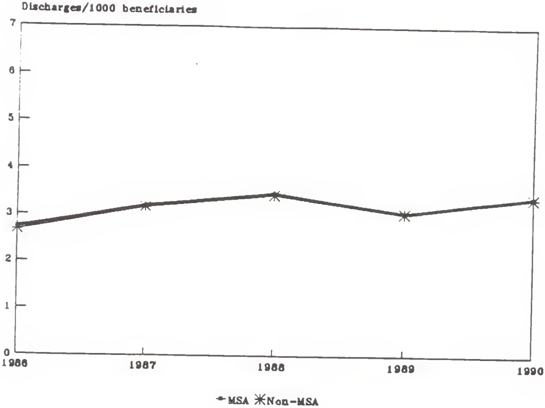


Figure 6. Coronary Artery Bypass Graft
30-Day Post-Admission Mortality Rates for Medicare Beneficiaries
65 Years of Age and Older, by Geographic Area, U.S., 1986-90

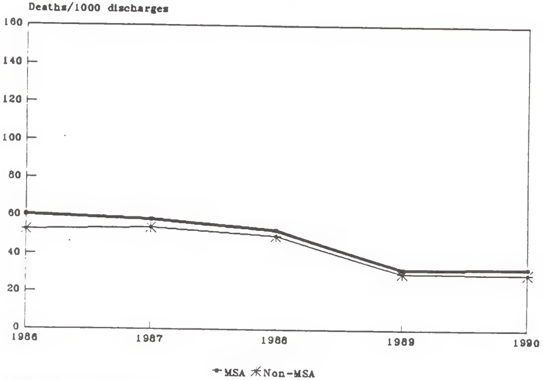


Figure 7. Hypertension
Discharge Rates for Medicare Beneficiaries 65 Years of Age and Older, by Race and Sex, U.S., 1986–90

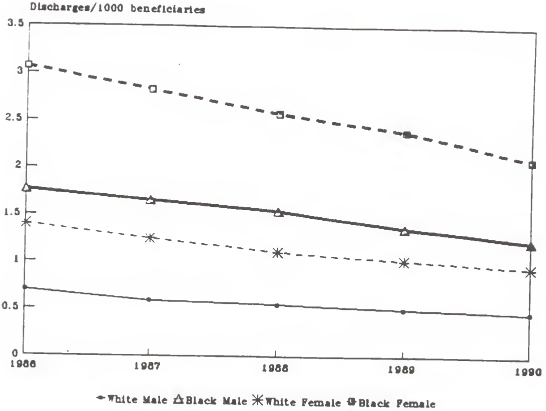


Figure 8. Hypertension
30–Day Post–Admission Mortality Rates for Medicare Beneficiaries 65 Years of Age and Older, by Race and Sex, U.S., 1986–90

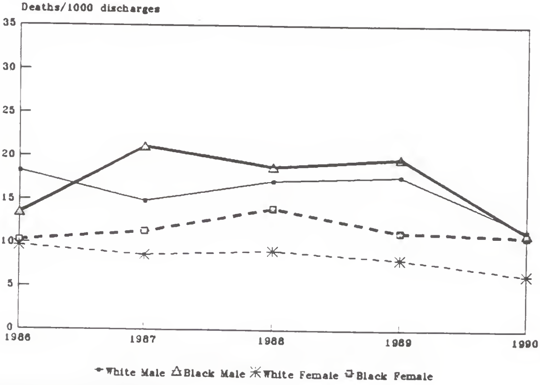


Figure 9. Congestive Heart Failure Discharge Rates for Medicare Beneficiaries 65 Years of Age and Older, by Age, U.S., 1986–90

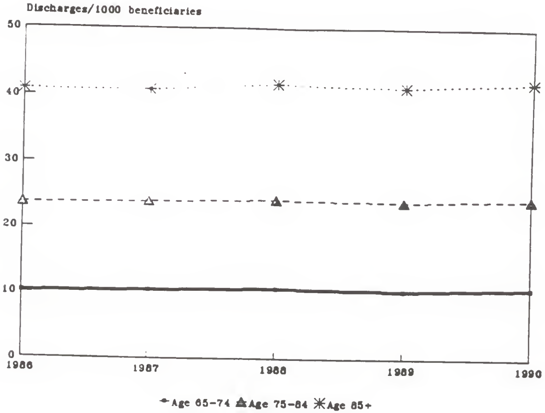
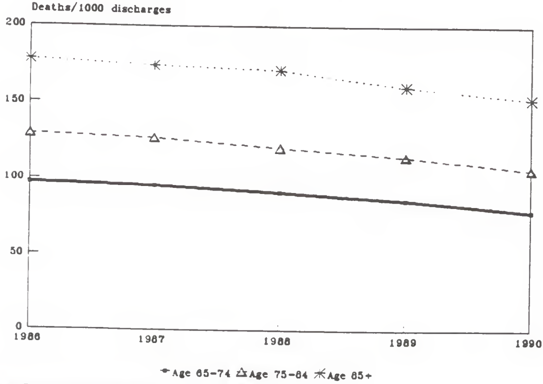


Figure 10. Congestive Heart Failure 30–Day Post–Admission Mortality Rates for Medicare Beneficiaries 65 Years of Age and Older, by Age, U.S., 1986–90



Finally, Figures 11 and 12 present information for asthma hospitalizations for MSA and non-MSA residents. Although the discharge rate for non-MSA residents is consistently greater (7 percent in 1990) than for MSA residents, the trend in the discharge rates for the non-MSA residents was decreasing. This could bring the rates closer together over time. As with several other conditions and procedures, the group (non-MSA residents) that had the higher discharge rate for asthma, had the lower 30-day post-admission mortality rate.

Figure 11. Asthma
Discharge Rates for Medicare Beneficiaries 65 Years of Age and Older, by Geographic Area, U.S., 1986-90

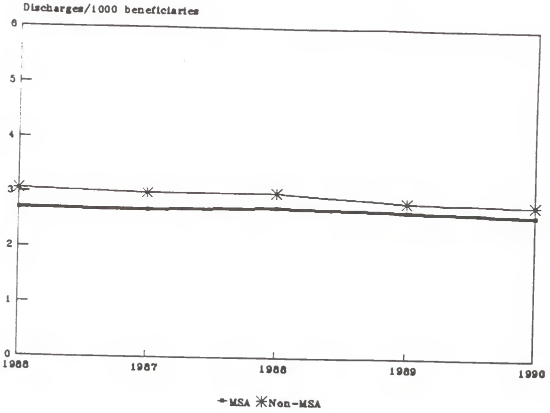
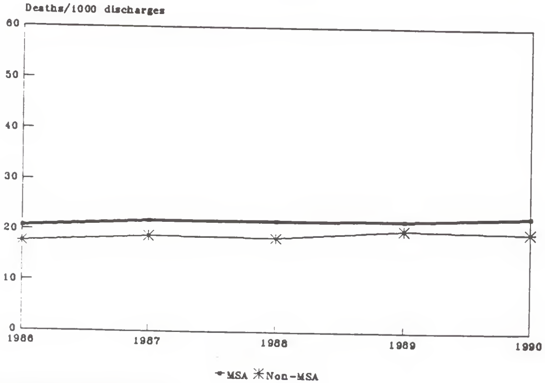


Figure 12. Asthma
30-Day Post-Admission Mortality Rates for Medicare Beneficiaries 65 Years of Age and Older, by Geographic Area, U.S., 1986-90



DISCUSSION

The examples presented in this chapter, as well as the fuller analyses found in Appendix C, illustrate monitoring access to care from the perspective of hospitalized patients. The examples illustrate several issues relevant to the analysis of any major program change. There were secular trends in the rates of hospitalizations and mortality prior to physician payment reform which, if not considered, might be attributed to the program change. Thus, the analysis of trends across the full 6 years (1986-91) prior to the implementation of payment reform in 1992 will be necessary to understand subsequent changes. Information from the monitoring of hospitalizations can be used to identify changes which can be analyzed further. However, it will be difficult to attribute a change in hospitalization to the impact of payment reform without additional study.

These data show differences in the relationship of the rates and trends by race, sex, and age group and geographic area depending on the procedure or the condition examined. Trends for the most vulnerable groups will be of special interest. Subsequent reports will examine closely related procedures for which an increase in one may have an impact on the frequency of another (e.g. PTCA and CABG).

Clearly, one cannot assume that the need for a procedure or hospitalization is equal across all sex, race, age or geographic categories. To understand the need for hospitalization, it is necessary to understand the underlying health status of the specific groups within the population. In subsequent reports it will be important, wherever possible, to incorporate measures of need for service. Such information is generally not available in the Medicare administrative system. Thus, this year's report uses NHIS data and describes HCFA's efforts to develop the Current Beneficiary Survey (see Chapter 2). In addition, HCFA is developing a field test for the Medicare Beneficiary Health Status Registry, which, if feasible, will provide more complete data about a beneficiary's past and present health status. Data from these surveys are essential for determining need based on health status measures.

In order to relate changes in discharge rates to changes in 30-day post-admission mortality rates, it would also be helpful to have information concerning variations in the severity of illness at the time of hospitalization. The Uniform Clinical Data Set currently being developed by HCFA will contain clinical information that may be useful in developing measures of severity of illness.

The analysis of long-term trends in the use and outcomes of health care also demands an understanding of changes in the underlying need for services. Over a short period of time, the need for services across sex, race, age and geographic categories will seldom change significantly. However, over longer periods of time, differences in the need for services may change as risk factors, functional status, socio-economic status and medical history change with entering cohorts of Medicare beneficiaries. In addition, there may be developments in technology or changes in standards of medical practice that will alter the definition of need or the frequency or site of utilization. New procedures or drugs may provide greater benefits or reduce the risks of surgery. It will also be important to monitor the diffusion of improved or safer technologies and diagnostic tests in all vulnerable groups of the population.

In summary, monitoring for changes in hospitalization trends for selected medical and surgical conditions will be used to assess the changes in use and access to physician services. Data were assembled for 23 procedures and 29 conditions based on specific criteria that include: 1) sentinel conditions; 2) conditions or procedures with high incidence rates in the elderly Medicare population; 3) conditions or procedures experiencing modest to major rates of increase; 4) procedures undergoing changes in the method of clinical treatment; and 5) procedures that have an alternative surgery available as a treatment option. Future year's reports will continue these kinds of monitoring activities and analyses.

Chapter 6

Trends in use and access to physicians services of the aged and non-aged populations from the National Health Interview Survey (NHIS)

INTRODUCTION

National health surveys are sponsored by the Federal Government to provide information on important policy issues, including access to health care, particularly for vulnerable groups. In the past, these surveys were important in demonstrating the enabling effects on access to services for the elderly and the poor as Medicare and Medicaid were first implemented. National survey data can also be used to evaluate program changes because they collect certain important information on socio-economic factors and health status not available in administrative data systems. This chapter of the report presents information from the NHIS, a household survey of the non-institutionalized population conducted each year by the National Center for Health Statistics (NCHS), and discusses how it can be used to monitor the effects of physician payment reform on access.

The NHIS was chosen as part of the effort to evaluate the impact of physician payment reform because it is the only continuously available national survey that can provide data on use and access by various segments of the Medicare population before and after implementation of the new payment system. The NHIS can also be used for comparisons between the under and over age 65 population. Because the NHIS permits analyses by socio-demographic and health status variables not available in the Medicare administrative data system, it will be used in this and future reports to broaden our understanding about changes in the use and access to care by vulnerable groups as physician payment reform is implemented.

Previous studies on access to health care have examined indicators of *potential* access such as having a regular source of care, distance to source of care, and waiting time, as well as indicators of *realized* access such as health care use related to insurance coverage, self-reported health status, activity limitations, and the presence of chronic conditions (Aday, Fleming, Andersen, 1984). Data on such variables are generally recognized and accepted as measures of access to health care services. Because the NHIS does not have measures of potential access, this chapter of the report presents information only on realized access.

The purpose of this chapter is to examine use of physician services by Medicare beneficiaries in the baseline period prior to physician payment reform. Virtually the entire population 65 years of age and over is covered under the Medicare program; therefore, the entire aged population from the NHIS is included. Use of services by the 65 and over population is compared to use of services by the population 18-64 years of age. Comparisons between these two age groups will be continued through the post-physician payment reform period to determine if changes are limited to the aged or reflect overall national trends. First, trends in use of physician services are examined. Next, rates of physician use by health status categories and socio-demographic groups, and use of physician services in different geographic areas are presented. In addition, data on use of physician services for acute conditions and by place of service are presented.

METHODS

Data from the NHIS conducted in 1984, 1986, and 1989 are used in this chapter because these are the currently available years in which a supplement on health insurance coverage was added to the core survey. Approximately 41,000 households were interviewed in 1984; 25,000 in 1986; and 48,000 in 1989. The 1990 through 1994 surveys will include data on health insurance coverage and will be incorporated into future reports.

In this chapter, physician use is examined by socio-demographic characteristics, health status, and geographic area (an Endnotes section with definitions and additional information about the NHIS can be found at the conclusion of this chapter). Use of physician services includes telephone contacts with a physician as well as contacts made in person; it does not include contacts while an overnight patient in the hospital. Because the vast majority (about 90 percent) of these physician contacts are in person, the term visit will be used rather than contact.

The focus of the analysis is on vulnerable segments of the Medicare population: persons with low income; Medicare enrollees without any supplemental health insurance; Medicare enrollees dually entitled to Medicaid; persons in self-reported poor health, or persons with chronic conditions or activity limitations; racial minorities; and persons residing in rural areas. Use rates by vulnerable segments of the population are measured in several ways: 1) the percent of persons with a physician visit in a year; 2) the mean number of visits per person per year; 3) the percent of acute conditions medically attended in a year; and 4) the proportion of physician visits in a year occurring in physicians' offices. Comparisons of these utilization measures are made across population groups. The percent change in use of physician services between 1984 and 1989 is used to measure trends during the baseline period. When the phrase "use of physician services" is used in the text, it refers to both the percent of persons with a visit and the mean visit rate.

All estimates in this report have relative standard errors (the standard error divided by the estimate) of 15 percent or less. These relative standard errors were calculated using the SESUDAAN software package; this software package takes the effects of complex sampling designs into account when deriving the relative standard errors. Because the sampling method used in 1984 was different than later years, the relative standard errors for the percent of acute conditions medically attended in 1984 could not be computed using this software package. Unless otherwise noted, the differences discussed in the text are significant at the .05 level using the Z test. The distribution of people by activity limitation status and socio-demographic characteristics was not tested for statistical significance.

RESULTS

Trends in physician visits, 1984, 1986, 1989

Each year, use of physician services was higher for persons age 65 and over than for persons 18-64 years of age. In 1989, 85 percent of the elderly and 72 percent of the younger age group had a physician visit (Table 1). Moreover, during the period 1984 to 1989, the percent of persons with a visit increased 4.1 percent for the elderly while the increase for younger persons was only 2.6 percent. The mean number of visits per person increased by 7.5 percent for the elderly to a rate of 8.9 visits in 1989, and by 5.9 percent for the younger age group to a rate of 5.2 visits in 1989. The visit rate increased more for the older elderly, persons 75 years and over, than for those 65-74 years of age. However, the increase in the visit rate for the older elderly was not significantly greater than the increase for those 65-74 years of age.

Use of physician services and health status

As expected, use of services was highest for persons reporting the poorest health compared to persons in the best health on all three health status measures examined: self-reported health status, activity limitation and presence of at least one chronic condition (Table 2). The percent of persons with a physician visit as well as the mean number of visits per person was greater for persons reporting fair/poor health status than for persons reporting excellent/very good or good health. This pattern was consistent across all 3 study years, and for both the younger and older age categories. In 1989, for example, the proportion of persons 65 years of age and over with a physician visit was 80 percent for those reporting excellent/very good health and 92 percent for those reporting fair/poor health; the mean number of visits was 5.5 for those in excellent/very good health and 14.7 for those in fair/poor health. It is interesting to observe that in each of the 3 years, the mean number of visits for persons in fair/poor health was about the same for persons 65 years of age and over as it was for persons 18-64 years of age.

For both the population over 65 and persons 18-64 years of age, the mean visit rate was strikingly higher for persons with the most severe activity limitations. In 1989, for example, persons 65 years of age and over who were unable to perform their major activity averaged 19.5 visits, compared with 5.9 visits for persons without an activity limitation.

Similarly, use of services was much higher for persons who reported having at least one chronic condition than for persons without a chronic condition. This was true for both age groups. In 1989, for example, persons 65 years of age and over reporting a chronic condition, averaged 12.3 visits compared with 2.3 visits for persons without a chronic condition.

Use of physician services and socio-demographic characteristics

For the population 65 years of age and over, the mean visit rate was highest for those with Medicare and other public coverage (primarily Medicaid), compared to those with Medicare and other coverage (e.g., Medigap policies), and those with Medicare only (Table 3). This pattern was consistent for each of the study years. In 1989, for example, persons with Medicare and other public coverage averaged 13.1 visits per person. For that same year, the mean number of visits was 8.8 for persons with Medicare and other coverage and 7.5 for persons with only Medicare coverage. The percent of persons with a visit was lowest for those with Medicare coverage only. This pattern was also consistent for each of the study years.

For persons 18-64 years of age, use of physician services was highest for those with public coverage and lowest for the uninsured. This pattern was consistent for each of the study years. In 1989, for persons with public coverage, the proportion with a physician visit was 85 percent, and the mean number of visits was 11.1. For that same year, for the uninsured, the proportion of persons with a physician visit was 57 percent, and the mean number of visits was 3.2.

As shown in Table 3, across all 3 study years and for both age categories, use of physician services was similar for the poor/low income group compared to the non-poor group. The poor/low income group includes persons with family incomes at 200 percent or less of the poverty level.

Across all 3 study years and for both age groups, the percent of persons with a physician visit was very similar for white and black persons. In the older age group, black persons had significantly more visits per person in 1989 than white persons.

Use of physician services and geographic area

Use of physician services by census region did not show any consistent pattern for either age group. As shown in Table 4, during all 3 study years and for both age groups, there was a slightly higher mean visit rate for persons living in the MSA central-city area although tests of the differences were not always statistically significant.

Use of physician services by health status and socio-demographic characteristics

The distribution of people by activity limitation status and socio-demographic characteristics is presented first (Table 5). The combined effects of activity limitation and selected socio-demographic characteristics on physician use are examined next (Table 6). Although not shown in this report, we have developed similar tables on self-reported health status and chronic conditions by socio-demographic characteristics and will be using them to monitor trends in use and access. In Table 6, data for 1984, 1986 and 1989 are combined because of sample size.

Of all aged persons, 10 percent were unable to perform their major activity (Table 5). This proportion was much higher among the aged covered by Medicare and another public program (22.8 percent) than for the other two insurance groups. Of the younger population, persons 18-64 years of age, a smaller proportion (4.5 percent) were unable to perform their major activity; by insurance group, the proportion was dramatically higher (30.9 percent) for those receiving public coverage. By income level, in both age groups, the proportion unable to perform their major activity was higher for those in the poor/low income group.

Table 6 examines the combined effect of insurance and activity limitation on physician use. The table shows that across all the activity limitation groups among the aged, use of physician services was generally lowest for persons with Medicare coverage only and highest for those with Medicare and other public coverage. These differences were not always statistically significant. Across all activity limitation groups, among the population 18-64 years of age, the uninsured had much lower use of physician services than those persons with health insurance.

In Table 3, for both older and younger persons, those in the poor/low income group had a similar visit rate compared with the non-poor. When activity limitations are controlled for, poor/low income persons unable to perform their major activity had a lower visit rate than the non-poor group with the same activity limitation. However, for the aged, the difference was not statistically significant.

Acute conditions medically attended

Acute conditions are diseases or injuries with an onset of 3 months or less prior to the interview. For the aged, about three quarters of acute conditions were medically attended, while for the younger age group, slightly over one half were medically attended (Table 7). This was true across all 3 study years.

There was no consistent pattern year-by-year in the percent of acute conditions medically attended by insurance status for aged persons. For the 18-64 year old group, in each year the percent of acute conditions medically attended was highest for those with public coverage and lowest for the uninsured.

When the percent of acute conditions medically attended was examined by income for the aged, no pronounced pattern was seen across the 3 study years. In 1989, the not poor and the poor/low income groups each had about 73 percent of acute conditions medically attended. In that same year, for the 18-64 year old group, the percent of acute conditions medically attended was slightly higher for the poor/low income group compared to the not poor group.

There was no clear pattern in the percent of acute conditions medically attended by self-reported health status among the aged. In the population 18-64 years of age, persons in fair/poor health had higher rates of acute conditions medically attended than persons reporting excellent/very good health.

For both age groups and in each of the study years, black persons had a higher percent of acute conditions medically attended than white persons. Of the differences that could be tested, only the difference in 1989 between white and black persons 18-64 years of age was statistically significant. The percent of acute conditions medically attended was 56 percent for white persons 18-64 years of age and 68 percent for black persons 18-64 years of age.

Proportion of physicians visits in physicians offices

Another measure of access is the proportion of physician visits occurring in a physician's office as opposed to other sites, such as an emergency room. Slightly over half of all physician visits occurred in physicians' offices during the 3 study years for both age groups (Table 8). For persons 65 years of age and over, the proportion was highest (60 percent) for persons with Medicare and other coverage. The proportion was about the same for persons with Medicare and other public coverage (48 percent) and Medicare only (49 percent).

For persons 18-64 years of age, the proportion of total visits occurring in a physician's office was highest for persons with insurance but not through a public program. The proportion was lowest for persons with public coverage.

DISCUSSION

The NHIS was used to understand patterns of use of physician services for several vulnerable groups of the population. For the elderly this includes: persons with low income; Medicare enrollees without any supplemental health insurance; Medicare enrollees dually entitled to Medicaid; persons in self-reported poor health, or persons with chronic conditions or activity limitations; racial minorities; and persons residing in rural areas. For the population 18-64 years of age, the vulnerable insurance group was the uninsured.

Data from the NHIS indicate that between 1984 and 1989, use of physician services increased for persons under and over age 65. The increase was slightly higher for the aged. It will be important to see if this pattern of increasing utilization persists in later years of the pre-physician payment reform period. This will aid in interpreting any differences in use of physician services in the post-reform period.

The baseline data in this analysis suggest that as physician payment reform is implemented it will be important to monitor access for vulnerable groups. Figure 1 summarizes the mean visit rate for the elderly by insurance category and activity limitation. It shows that elderly persons with Medicare coverage only--no matter what their health status may be--have fewer physician visits than other Medicare enrollees. Because Medicare payments for physician visits will increase under physician payment reform, the cost-sharing amounts will also increase. Since elderly persons with Medicare coverage only are likely to have higher out-of-pocket liability than Medicare enrollees with additional coverage, they are a group that may be at risk for access problems. It is also possible that increases in out-of-pocket liability due to higher cost-sharing amounts may be offset by limits imposed on balance billing.

Health status measures are important in understanding visit rates. Clearly, persons in poor health have more of a need for health care services and their need is reflected in higher physician visit rates. One of the most sensitive health status measures appears to be activity limitation status. The visit rate is substantially higher for persons unable to perform their major activity than it is for persons without limitations. It is also interesting that for persons in the worst health, regardless of the health status measure examined, use of physician services is remarkably similar for both the under and over age 65 population (Figure 2). Moreover, those in poor health are particularly vulnerable if this need is coupled with a financial barrier to obtaining care, such as limited health insurance coverage, low income, or high out-of-pocket liability. Physician use rates for persons in poor health in the over and under 65 populations will be monitored in the post-physician payment reform period to see if the relationships shown in Figure 2 have changed.

Data from the NHIS indicate that the visit rate for black persons is similar to the rate for white persons (Figure 3). Health status, however, is not controlled for in this analysis; future analyses will attempt to control for health status.

Concern has been expressed that physician payment reform will have a differential effect on certain parts of the United States and research has shown that persons who reside in rural areas may already have less access to health care (Dor and Holahan, 1990). Figure 4 shows that for both age groups, the mean visit rates are not very different across geographic areas. It is expected that with physician payment reform, payments for physician visits will increase in rural areas and perhaps make access easier. At the same time out-of-pocket liability may increase. It will be important, therefore, to monitor use of physician services in these geographic areas as payment reform is implemented. It is possible, as noted earlier, that increases in out-of-pocket liability due to higher payments in rural areas may be offset by limits imposed on balance billing.

As noted earlier, the NHIS contains information on realized access, but does not have any measures of potential access. The Medicare Current Beneficiary Survey (MCBS), a national survey of Medicare enrollees implemented by HCFA on October 1, 1991, will contain information about potential access and can be linked to Medicare utilization data. The MCBS will be incorporated into future analyses; however, since it was begun in the later part of 1991, it will have only limited pre-physician payment reform data. Additionally, because the MCBS does not collect data on the general population under age 65, the NHIS will continue to be used in future reports along with the MCBS to compare trends between the aged and the population 18-64 years of age.

Because there were only three data points for this analysis, the report did not focus on trends in use of physician services. Additional years will be added to future reports placing the analysis of trends on a firmer foundation (the 1990 NHIS will be added to next year's report). In order to examine trends, we will explore the use of a multivariate model that includes trend variables to analyze changes through time.

In summary, the NHIS confirms what had been reported before. Health insurance, health status and income are all important variables influencing access to and use of services. The increase in Medicare fees for physician visits may increase patients' out-of-pocket liability for these services, while the decrease in fees for procedures may decrease liability. The limitations on balance billing may also act to decrease liability. Future analyses from the NHIS should help to identify the impacts of physician payment reform on various segments of the Medicare population.

Endnotes

Definitions of socio-demographic characteristics, health status categories, and geographic areas:

SOCIO-DEMOGRAPHIC CHARACTERISTICS

Insurance coverage:

For the population 65 years of age and over, this chapter categorizes insurance status as Medicare only, Medicare and other public health coverage, Medicare and other insurance, insurance other than Medicare, and unknown or none. Each of these groups is mutually exclusive. The Medicare and other public coverage group primarily includes persons with Medicare and Medicaid. The Medicare and other group primarily includes Medicare enrollees with privately purchased "Medigap" coverage and Medicare enrollees with employer-sponsored supplementary coverage.

For the population 18-64 years of age insurance status was defined as public coverage, insured but not through a public program, uninsured, and unknown. As for the over 65 population, these categories are also mutually exclusive. Public coverage includes Medicare, Medicaid, and any public assistance programs that pay for health care. For both age groups, Medicaid coverage was imputed for persons with Aid to Families with Dependent Children or Supplemental Security Income who did not report Medicaid coverage. The insurance other than Medicare and the unknown/no coverage groups for the population 65 years of age and over, and the unknown insurance status group for persons 18-64 years of age are included in the totals but are not shown separately in this analysis.

Income:

The NHIS collects information on family income, but in 1989 family income was not reported by 16 percent of all respondents and by about 23 percent of the elderly. Therefore, income was imputed for persons with an unknown value using a model that included family size, race, whether there is a married couple in the family, the number of adults in the family in the labor force, and other variables.

Race:

Race is broken down only as white or black.

HEALTH STATUS

Self-reported health status:

There are five levels of self-reported health status in the NHIS: excellent, very good, good, fair, and poor. For the purposes of this analysis, persons who reported excellent and very good health were combined into one group, and persons who reported fair and poor health were combined into another group.

Activity limitation status:
There are four levels of activity limitation in the NHIS: unable to perform major activity, limited in kind or amount of major activity, limited in other activities, and not limited. The not limited category includes persons with an unknown activity limitation level. For the purpose of this analysis, data for persons with a limitation in kind or amount of major activity or a limitation in other activities have been combined into a category called "limited." A major activity is defined in the NHIS as working or keeping house for persons 18-69 years of age, and capacity for independent living for persons 70 years of age and over.

Chronic and acute conditions:
Chronic conditions are defined by NCHS as conditions with an onset of more than 3 months prior to the interview and a duration of more than 3 months. Certain conditions, such as diabetes, are always considered chronic.

NCHS defines an acute condition as any disease or injury with an onset in the 3-month period prior to the interview. To be included in the survey, the acute condition must have had an impact on behavior, such as causing the person to cut down on his or her usual activity, or must have resulted in contact with a physician.

GEOGRAPHIC AREA

Geographic area was defined in terms of census region: northeast, midwest, south, and west. It was also defined in terms of whether or not the person resided in an MSA. MSAs are further divided into central city and non-central city areas.

Table 1. Number and percent of persons with a physician visit and mean number of visits per person, by age: 1984, 1986 and 1989.

	Number of persons (in millions)	Percent with a visit			Mean number of visits per person			Percent change 1984-89	
								Percent with a visit	Mean number of visits per person
Age	1989	1984	1986	1989	1984	1986	1989		
65 years and over	29.2	82	83	85	8.2	9.1	8.9	4.1	7.5
65-74 years	17.8	81	81	84	7.7	8.1	8.2	3.6	6.1
75 and over	11.4	84	85	88	9.1	10.6	9.9	4.9	9.1
18-64 years	150.3	70	71	72	4.9	5.2	5.2	2.6	5.9

Source: National Health Interview Survey, National Center for Health Statistics.

Table 2. Percent of persons with a physician visit and mean number of visits per person, by selected health status measures, and age: 1984, 1986 and 1989.

	Number of persons (in millions)	Percent with a physician visit			Mean number of visits per person		
	1989	1984	1986	1989	1984	1986	1989
Health status and age							
Self-reported health status							
65 years and over (1)	29.2	82	83	85	8.2	9.1	8.9
Excellent/Very Good	11.5	75	75	80	5.4	5.6	5.5
Good	9.3	82	84	86	6.8	7.6	7.7
Fair/Poor	8.3	90	91	92	12.9	14.6	14.7
18-64 years (1)	150.3	70	71	72	4.9	5.2	5.2
Excellent/Very Good	101.7	67	68	70	3.4	3.7	3.7
Good	34.5	73	74	75	5.6	5.6	6.0
Fair/Poor	13.5	85	85	87	12.5	14.8	14.4
Activity limitation							
65 years and over	29.2	82	83	85	8.2	9.1	8.9
Not limited	18.0	77	77	61	5.5	6.0	5.9
Limited	8.2	89	91	92	10.3	11.0	11.6
Unable to perform major activity	3.0	93	92	95	18.3	21.6	19.5
18-64 years	150.3	70	71	72	4.9	5.2	5.2
Not limited	130.7	68	69	70	3.8	4.0	4.0
Limited	12.9	85	86	86	9.8	10.1	9.9
Unable to perform major activity	6.7	90	90	91	17.3	20.3	20.0
Presence of at least one chronic conditon							
65 years and over	29.2	82	83	85	8.2	9.1	8.9
Yes	19.1	89	89	91	11.5	12.6	12.3
No	10.1	68	69	74	1.7	2.0	2.3
18-64 years	150.3	70	71	72	4.9	5.2	5.2
Yes	52.1	84	84	85	10.1	10.7	10.9
No	98.2	63	64	65	2.2	2.2	2.2

(1) Includes persons with unknown health status.

Source: National Health Interview Survey, National Center for Health Statistics.

Table 3. Percent of persons with a physician visit and mean number of visits per person, by selected socio-demographic characteristics: 1984, 1986 and 1989.

Socio-demographic characteristics	Number of persons (in millions)	Percent with a physician visit			Mean number of visits per person		
	1989	1984	1986	1989	1984	1986	1989
Health insurance status							
65 years and over (1)	29.2	82	83	85	8.2	9.1	8.9
Medicare only	4.6	76	73	79	7.6	8.3	7.5
Medicare and other public program	1.9	89	86	90	11.9	14.0	13.1
Medicare and other coverage	20.4	84	85	87	8.3	8.9	8.8
18-64 years (2)	150.3	70	71	72	4.9	5.2	5.2
Public program	9.6	84	83	85	10.1	11.9	11.1
Insured but not public program	111.8	72	73	75	4.7	5.0	5.1
Uninsured	23.6	57	57	57	3.7	3.6	3.2
Income Level							
65 years and over	29.2	82	83	85	8.2	9.1	8.9
Poor/Low income	12.2	81	81	84	8.4	9.3	9.1
Not poor	17.0	82	84	86	8.1	8.9	8.7
18-64 years	150.3	70	71	72	4.9	5.2	5.2
Poor/Low income	41.4	67	68	69	5.1	5.7	5.4
Not poor	108.9	72	72	73	4.8	5.0	5.1
Race							
65 years and over (3)	29.2	82	83	85	8.2	9.1	8.9
White	26.3	82	83	85	8.2	9.1	8.7
Black	2.5	82	81	85	9.8	9.1	11.0
18-64 years (3)	150.3	70	71	72	4.9	5.2	5.2
White	127.5	71	72	73	5.0	5.3	5.3
Black	17.5	70	69	72	4.8	5.2	4.7

(1) Includes persons with insurance other than Medicare and unknown insurance.
(2) Includes persons with unknown insurance.
(3) Includes persons with race listed as "other".

Source: National Health Interview Survey, National Center for Health Statistics.

Table 4. Percent of persons with a physician visit and mean number of visits per person, by geographic area and age: 1984, 1986 and 1989.

Geographic area and age	Number of persons (in millions)	Percent with a physician visit			Mean number of visits per person		
	1989	1984	1986	1989	1984	1986	1989
65 years and over	29.2	82	83	85	8.2	9.1	8.9
Census Region							
Northeast	6.9	82	83	86	8.2	8.0	8.6
Midwest	6.9	80	83	85	7.9	8.4	8.3
South	9.9	83	81	86	8.5	9.3	9.8
West	5.5	83	85	84	8.4	11.3	8.2
MSA Residence							
MSA central City	8.8	81	82	85	9.1	9.6	9.3
MSA not central city	12.5	85	84	87	8.6	8.4	8.8
Non-MSA	7.8	80	81	84	7.3	9.5	8.4
18 to 64 years	150.3	70	71	72	4.9	5.2	5.2
Census Region							
Northeast	30.7	71	71	73	4.8	4.8	4.9
Midwest	36.8	70	72	73	5.1	5.4	5.3
South	50.8	70	71	72	4.7	4.9	5.2
West	32.0	70	70	72	5.2	5.9	5.4
MSA Residence							
MSA central City	46.4	70	70	73	5.3	5.7	5.5
MSA not central city	72.5	71	72	73	5.0	5.1	5.0
Non-MSA	31.4	70	69	71	4.4	4.9	5.1

Source: National Health Interview Survey, National Center for Health Statistics.

Table 5. Distribution of persons by selected socio-demographic characteristics and activity limitation status: 1989.

Socio-demographic characteristics	Number of persons (in millions)	Percent Distribution			
		Total	Unable to to perform major activity	Limited	Not limited
Health insurance status					
65 years and over (1)	29.2	100.0	10.1	28.2	61.7
Medicare only	4.6	100.0	12.3	29.8	57.9
Medicare and other public program	1.9	100.0	22.8	40.4	36.9
Medicare and other coverage	20.4	100.0	8.2	27.3	64.5
18-64 years (2)	150.3	100.0	4.5	8.6	86.9
Public program	9.6	100.0	30.9	18.0	51.1
Insured but not public program	111.8	100.0	2.1	7.7	90.1
Uninsured	23.6	100.0	5.0	9.2	85.8
Income level					
65 years and over	29.2	100.0	10.1	28.2	61.7
Poor/Low income	12.2	100.0	12.5	32.7	54.8
Not poor	17.0	100.0	8.4	24.8	66.8
18-64 years	150.3	100.0	4.5	8.6	86.9
Poor/Low income	41.4	100.0	9.3	11.1	79.7
Not poor	108.9	100.0	2.7	7.6	89.7

(1) Includes persons with insurance other than Medicare and unknown insurance.
(2) Includes persons with unknown insurance.

Source: National Health Interview Survey, National Center for Health Statistics.

Table 6. Percent of persons with a physician visit and mean number of visits per person, by selected socio-demographic characteristics and activity limitation: average of 1984, 1986 and 1989.

	Activity Limitation Status					
	Not limited		Limited		Unable to perform major activity	
Socio-demographic characteristics	Percent with a physician visit	Mean number of visits	Percent with a physician visit	Mean number of visits	Percent with a physician visit	Mean number of visits
Health insurance status						
65 years and over (1)	78	5.8	91	11.0	93	19.8
Medicare only	69	4.7	85	9.1	89	18.3
Medicare and other public program	83	6.9	90	12.5	95	23.5
Medicare and other coverage	81	6.0	93	11.4	94	20.1
18-64 years (2)	69	3.9	86	9.9	90	19.2
Public program	77	6.1	90	12.4	92	18.7
Insured but not public program	72	4.1	87	10.0	92	22.1
Uninsured	54	2.5	75	7.2	83	13.9
Income level						
65 years and over	78	5.8	91	11.0	93	19.8
Poor/Low income	76	5.6	89	10.7	92	18.7
Not poor	80	5.9	93	11.4	94	21.2
18-64 years	69	3.9	86	9.9	90	19.2
Poor/Low income	64	3.6	83	9.5	89	17.5
Not poor	71	4.0	88	10.2	92	21.7

(1) Includes persons with insurance other than Medicare and unknown insurance.
(2) Includes persons with unknown insurance.

Source: National Health Interview Survey, National Center for Health Statistics.

Table 7. Percent of acute conditions medically attended by selected demographic characteristics: 1984 to 1989.

Selected characteristic	Year (5) 1984	1986	1989	Average 1984-1989
Total	57	58	59	58
		Insurance status		
65 years and over (1)	70	75	73	73
Medicare only	68	70	69	69
Medicare & other public program	67	72	79	72
Medicare & other	72	76	73	74
18-64 years (2)	55	56	57	56
Public programs	69	73	72	71
Insured, not public program	55	56	57	56
Uninsured	53	46	47	49
		Income		
65 years and over	70	75	73	73
Poor/low	71	70	73	71
Not poor	69	80	73	74
18-64 years	55	56	57	56
Poor/low	60	58	60	59
Not poor	53	55	56	55
		Self-reported health status		
65 years and over (3)	70	75	73	73
Excellent/very good	73	75	67	72
Good	64	73	73	70
Fair/Poor	72	77	79	76
18-64 years (3)	55	56	57	56
Excellent/very good	53	54	53	54
Good	55	57	61	58
Fair/poor	66	62	68	65
		Race		
65 years and over (4)	70	75	73	73
White	69	75	73	72
Black	78	77	78	78
18-64 years (4)	55	56	57	56
White	55	55	56	55
Black	61	61	68	64

Notes:

(1) The total for the age group includes persons with insurance other than Medicare and unknown insurance.

(2) The total for the age group includes persons with unknown insurance.

(3) The total for the age group includes persons with unknown health status.

(4) The total for the age group includes persons with race listed as "other".

(5) Relative standard errors were not available for 1984.

Source: National Health Interview Survey, National Center for Health Statistics.

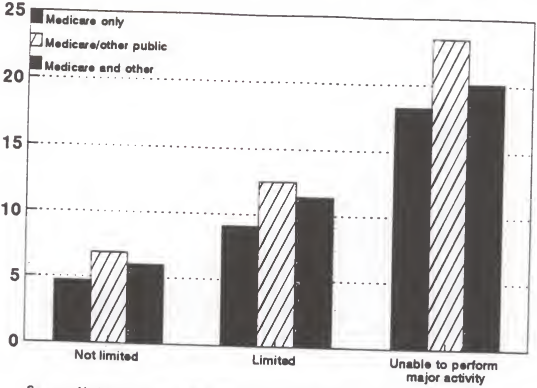
Table 8. Percent of physician visits in physicians' offices by age group and insurance category: 1984–1989.

Insurance category and age	Year 1984	1986	1989	Average 1984–1989
Total	57	55	58	56
65 years and over (1)	57	54	59	57
Medicare only	53	39	56	49
Medicare & other public program	46	40	58	48
Medicare & other	60	59	61	60
18–64 years (2)	57	55	58	56
Public program	44	42	45	43
Insured but not public program	60	58	61	60
Uninsured	50	49	51	50

(1) Includes persons with insurance other than Medicare and unknown insurance.
(2) Includes persons with unknown insurance.

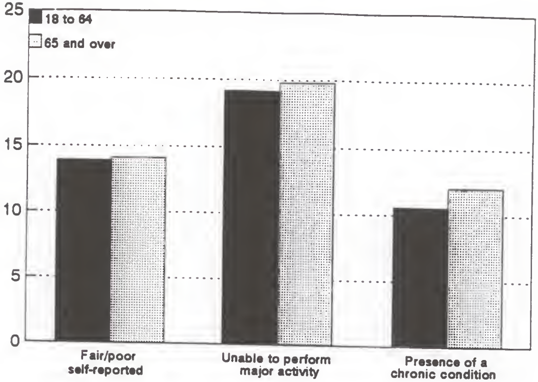
Source: National Health Interview Survey, National Center for Health Statistics.

Figure 1
Mean number of physician visits for persons 65 years of age and over by activity limitation status and insurance category, average of 1984, 1986, and 1989



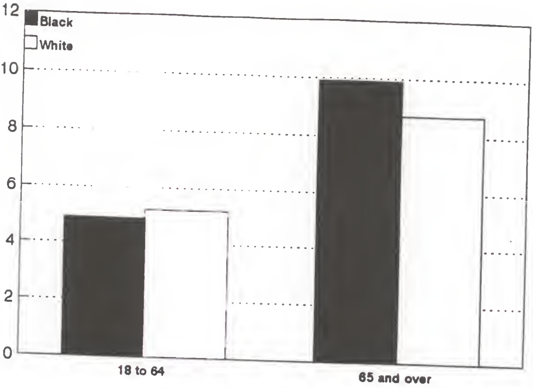
Source: National Health Interview Survey, National Center for Health Statistics

Figure 2
Mean number of physician visits by age and health status, average of 1984, 1986 and 1989



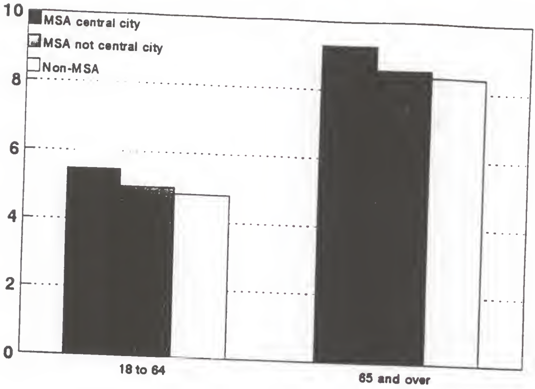
Source: National Health Interview Survey, National Center for Health Statistics

Figure 3
Mean number of physician visits by age and race, average of 1984, 1986 and 1989



Source: National Health Interview Survey, National Center for Health Statistics

Figure 4
Mean number of physician visits by age and geographic area, average of 1984, 1986, and 1989



Source: National Health Interview Survey, National Center for Health Statistics

Chapter 7

Recommendations and future work

Chapter 7

Recommendations and future work

The statute requires the Secretary of the Department of Health and Human Services to include as part of this annual Medicare Physician Payment report recommendations:

(i) addressing any identified patterns of inappropriate utilization,
(ii) on utilization review,
(iii) on physician education or patient education,
(iv) addressing any problem of beneficiary access to care made evident by the monitoring process, and
(v) on such matters as the Secretary deems appropriate.

This chapter discusses the Department's actions regarding each of these issues. The final section of this chapter addresses plans for future analyses of utilization and access to care.

Response to the mandate for recommendations

I. Addressing any identified patterns of inappropriate utilization

The Agency for Health Care Policy and Research (AHCPR) in the Department of Health and Human Services was established by OBRA 1989 to enhance the quality, appropriateness, and effectiveness of health care services. To carry out this legislative mandate, AHCPR created the Medical Treatment and Effectiveness Program (MEDTEP), a program that has four components: (1) research projects relating to understanding patient outcomes; (2) the development of clinical practice guidelines, medical review criteria, standards of quality and performance measures; (3) development of data bases to support effectiveness research; and (4) dissemination of research findings and practice guidelines.

MEDTEP's research related to patient outcomes is conducted primarily by Patient Outcomes Research Teams (PORTs). These projects are major 5-year studies. The work of the PORTs includes syntheses of the literature, as well as research and the development of clinical recommendations. An important feature of the work of the PORTs is the dissemination of findings, and the evaluation of the dissemination on changes in clinical practice. As of January 1992, 12 PORT projects have been awarded. These projects include the following clinical conditions: low back pain; total knee replacement; acute myocardial infarction; cataracts; prostate disease; ischemic heart disease; biliary tract disease; hip fracture and replacement; childbirth; diabetes; pneumonia; and stroke.

The second major activity of the MEDTEP is the development of clinical practice guidelines. A total of 16 practice guidelines are in various stages of development and peer review. The first three of these guidelines will be released by May 30, 1992; they are for urinary incontinence, acute post-operative pain, and prediction, prevention and early intervention of pressure ulcers.

Health care providers, educators, and consumers may use these guidelines to help determine how to prevent, diagnose, treat, and manage health conditions most effectively. Findings from the PORTs and similar research as well as exhaustive literature reviews and research syntheses are used to develop these guidelines.

In addition to the clinical guidelines, AHCPR has initiated the process of translating the guidelines into medical review criteria, standards of quality, and performance measures. The AHCPR has awarded a contract to the American Medical Review Research Center (AMRRC) that includes translating three guidelines (urinary incontinence, postoperative pain, and benign prostate disease) into medical review criteria that can be applied by PROs. Additional contracts will include the translation of other guidelines into review criteria.

To support this work, as well as future efforts to improve the validity and reliability of medical review methods and procedures, AHCPR has also established a Workgroup on Methods of Developing Medical Review Criteria, Standards, and Performance Measures. A Federal Liaison Group for this Workgroup includes representatives of HCFA, the Department of Veterans Affairs, and the Department of Defense as well as AHCPR. Active involvement with the Workgroup, along with HCFA and PRO involvement in the development of medical review criteria based on clinical guidelines, will help refine and focus efforts to identify inappropriate patterns of health care utilization.

The Health Care Financing Administration (HCFA) has the primary responsibility for monitoring various changes occurring during the new Medicare physician payment system. HCFA will utilize the findings from the MEDTEP program to help identify patterns of inappropriate use and address them through the Peer Review Organization (PRO) system.

II. On utilization review

The PRO system operated by HCFA conducts oversight of physician practice patterns. From its beginning, the PRO system has incorporated available knowledge, methods, and approaches into the review process. In a major effort to advance the efficiency and effectiveness of PRO review, information from selected medical records are being abstracted by the PROs into Uniform Clinical Data Set (UCDS) data. In February 1991, several PROs began to collect pilot UCDS data on a random sample of discharges. Six PROs are now using UCDS as their screening tool for all routinelyselected cases to identify cases which should undergo utilization review by a physician adviser. In these PROs, UCDS and the associated Patient Care Algorithm System (PCAS) are used in place of traditional nurse review.

By the end of 1992 HCFA intends to award contracts to Clinical Data Abstraction Centers, which will abstract UCDS data for a sample of discharges; by early 1994 these centers will be abstracting data for all PROs. Although a UCDS data series for six States will stretch forward from early 1991, and for a majority of States from mid-1993, the 1991 data are of uneven quality because of startup adjustments and changes in the data collection system.

In addition to identifying cases to undergo utilization review, the UCDS data will provide baseline information for tracking appropriateness of care. At this time, these data have limitations for tracking appropriateness of care because PRO review is not yet a sufficiently standardized process. The first step toward making review more uniform is standardizing screening by using the PCAS in place of nurse review. However, the PCAS is still under development. Compared to traditional nurse screening, PCAS detects about the same number of cases that are ultimately confirmed by physician review as quality problems, but both screening approaches have had a high false positive rate and there is some evidence that they also have had a significant number of false negatives. HCFA is working with the American Medical Association Practice Parameters Partnership and Forum to refine the PCAS algorithms. An immediate goal will be not only to reduce the false positive and false negative rates but also to make PCAS consistent with currently accepted practice guidelines. Because PCAS was intended as a screening system rather than a quality measurement system, trends in PCAS referrals will not necessarily reflect trends in appropriateness of care. However, experience is likely to identify specific PCAS referrals that are reliably associated with quality of care and these may be useful for tracking. As noted above, HCFA will also be working with AHCPR and with PROs to improve the reliability and consistency of physician review, as a complement to the improvements in consistency of screening. It will take time to identify and implement these improvements.

It should be observed that HCFA is committed to using evidence from quality and utilization review to modify care. The areas in which HCFA will have the best data on rates of inappropriate care will be those in which it is making major efforts to change medical practices. Thus, it will not be realistic to interpret changes in these areas in terms of the impact of physician payment reform. For example, about 40 percent of UCDS data collection will be focused on cardiovascular disease as part of the Cooperative Cardiovascular Project. The purpose of this project is to improve appropriateness of care for acute myocardial infarction, coronary artery bypass grafting, and percutaneous transluminal coronary angioplasty. HCFA expects selected data from the PROs to be available for focused analytic studies by the beginning of 1994.

III. On physician education or patient education

The underlying goal of the MEDTEP projects is to provide information about the appropriate use of various medical and surgical treatments. As the results and recommendations of the MEDTEP projects are finalized they will be disseminated to the provider community. As noted above, the MEDTEP program will concentrate on identifying methods and approaches that maximize the assimilation of knowledge into practice behavior.

IV. Addressing any problem of beneficiary access to care made evident by the monitoring process, and V. On such matters as the Secretary deems appropriate.

Two major efforts to monitor changes in the use of and access to physician services by Medicare beneficiaries under payment reform are presented in this report: (1) the development of a monitoring system to provide timely information on use of Part B services and on physician availability under payment reform, and (2) the development of baseline data for the period preceding payment reform. The monitoring system benefits from improvements in the flow of claims data into the National Claims History. The system will capture these data as they are received. Moreover, new reporting rules, such as the requirement for a unique physician identifier number and for physician submittal of unassigned claims, have the potential for improved Medicare data.

The new monitoring system will provide HCFA with quarterly data, beginning with the first quarter of 1992, on use of services under payment reform, using a classification system which groups the thousands of individual service codes into several broad classes, and many more detailed groups. A variety of additional geographic classifications (not shown in this report) will be used in the beneficiary monitoring system. For example, aggregate Part B payments by specialty and by State will be monitored. Data will also be produced from the Health Resource Profile Groups, which group all counties into four metropolitan groups and six non-metropolitan groups; for Health Professional Shortage Areas; and for Los Angeles, Dade and Manhattan counties. These groupings will increase our ability to detect changes in physician use occurring during payment reform.

To illustrate some elements of a system for monitoring physician availability, this report included an analysis of procedures that were subject to price changes preceding the Medicare fee schedule. When needed, future studies can examine changes in physicians' overall Medicare caseload and in caseload defined by the type of service, physician specialty, and by age and race of the beneficiary.

Data on use of and access to physicians services available from the new Medicare Current Beneficiary Survey (MCBS) can be analyzed in future studies of access to care. The MCBS, which began in the Fall of 1991, offers some advantages over both Medicare claims data and the NHIS for monitoring use and access. The Fall 1991 survey round included a supplement on access and satisfaction with care which will be repeated annually. Data from this supplement can be used to study trends in potential access, such as travel time to a physician and usual source of care. Also, the MCBS collects information on out-of-pocket expenditures for medical care so that trends in such expenses can be monitored. Finally, the MCBS will be linked to Medicare claims data. This linkage will permit studies of the relation of beneficiary characteristics to specific Medicare services.

The analyses presented in this report to Congress were performed in HCFA. Extramural studies funded through cooperative agreements sponsored by HCFA will extend the analyses of use and access. A 3-year cooperative agreement awarded in 1992 to the Center for Health Economics Research will examine the impact of the Medicare fee schedule on access to physician services. The first part of the study will focus on changes in access in geographic areas most affected by payment reform fee changes compared to changes in other areas. This part of the study will be based on a special 100 percent data base in 11 States which began in 1988, as well as national data from 1991-93. The second part of the study will develop more national Medicare trend data on physician use. A unique aspect of these two parts of the study will be the aggregation of claims data into episodes of treatment for selected procedures and conditions. The final part of the study will develop multivariate models to examine trends and patterns in access from the MCBS linked to Medicare claims data. The model will contain, as a predictor of access, a ratio of Medicare physician reimbursement to private insurers' average reimbursement.

Another 3-year cooperative agreement awarded to the Urban Institute will also look at issues in access to Medicare physician services. It will analyze trends in the volume, intensity, and price of physician services from 1985 though 1992, the first year of payment reform. It will examine the effect of changes in Medicare fees for overvalued services in 1990 on the volume of services. The Urban Institute will use the MCBS to examine the effect of beneficiary and market characteristics on the use of Medicare physician services. These may give us an idea about changes in use that may occur under payment reform.

In another effort, HCFA and Project HOPE are designing a set of descriptive tables focusing on supply-side indicators that can be used in monitoring changes in access to physicians' services under physician payment reform. These tables will compare data on physician-to-population ratios in the years following payment reform with baseline trend data for the years 1984 through 1990. The data can be analyzed by carrier localities, urban/rural areas, and medical specialty. Physician supply data will come from the Area Resource File.

Two projects, one recently completed and one underway, have been funded by HCFA in an effort to understand the relationship between technological innovation and Part B expenditures. The completed study was performed by the Center for Health Economics Research. The study analyzed diffusion patterns for the period 1985-89 for three pairs of competing technologies: CT and MRI of the head; CABG and PTCA; surgical methods for extracting stones from the kidney and upper urinary tract and extracorporeal shock wave lithotripsy (ESWL). The first procedure in each pair was relatively well-established compared to the second. The study found large increases in expenditures per Medicare beneficiary for the three new technologies (PTCA, MRI, and ESWL) over the 5-year study period compared with the more established ones.

A second study is currently underway at Project HOPE to extend the work recently completed by the Center for Health Economics Research. This study will analyze changes in treatment patterns between 1986-90 for selected technologies. Technologies under consideration for this analysis include endoscopies, imaging methods, and laser surgery. The study will examine changes in use rates for the procedures both through time and across geographic areas. This study is scheduled for completion in the summer of 1992.

Data for the 1993 Analyses

Despite the improvements in the availability of Medicare claims data resulting from the NCH and the institution of the monitoring systems, the 1993 analyses of changes in access to care and utilization of services will have only limited post-payment reform data. It is important to bear in mind the fact that the NCH reflects only a more timely flow of data from the intermediaries and carriers to the HCFA central office. It does not affect the lag time between when a service is rendered and when the physician or hospital claim reaches the intermediary or carrier. Consequently, there will always be a lag after the end of a particular time period before the data for that period are complete.

It is expected that when the next analyses are being prepared, Part B data from the monitoring system will be nearly complete for the first two quarters of 1992. These data can be used to examine total amounts and rates of physician services. Data for later quarters, which will not be complete, can be used for analysis of changes in the ratios of physician use among groups of interest, as was illustrated in Chapter 2. Data from other sources will not always be available for the post-payment reform period in the 1993 analyses. The latest hospital data available will be for 1991. NHIS data will cover 1990 and perhaps the Fall 1991 round of MCBS.

To develop an understanding of the impact of physician payment reform on utilization and access to care, longitudinal data will clearly be needed. The 1993 analyses can only reflect preliminary information from a few months following implementation of payment reform; it might take several years before meaningful trends can be identified. The major challenge in future analyses will be distinguishing the impact of physician payment reform from other changes in the health care delivery system.

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Appendix A

Chapter 3

APPENDIX A-1

DISTRIBUTION OF AVERAGE PREVAILING CHARGE REDUCTIONS BY STATE

PROCEDURE	ALABAMA	ARIZONA	OKLAHOMA	OREGON
Hip Replacement (s.e.) Range	-5.6 (0.17) -2.4 to -7.4	-4.0 (0.23) -0.5 to -5.2	0.3 (0.21) 4.2 to -0.5	-1.7 (0.19) 1.6 to -3.0
Knee Arthroplasty	-6.8 (0.21) -3.2 to -9.3	-3.7 (0.63) 9.1 to -6.4	-1.5 (0.26) 0.0 to -5.4	-1.8 (0.20) 0.9 to -3.6
Knee Arthroscopy	-14.4 (0.14) -11.3 to -15.4	-13.2 (0.23) -10.4 to -14.5	0.6 (0.23) 4.2 to -0.6	-0.7 (0.20) 2.5 to -2.7
Bronchoscopy	-2.8 (0.16) 0.0 to -6.0	-0.6 (0.42) 4.1 to -4.6	-7.5 (0.67) 0.0 to -17.6	-0.6 (0.28) 4.3 to -2.4
Coronary Artery Bypass Graft	-0.6 (0.22) 2.1 to -2.0	-3.0 (0.54) 0.6 to -6.2	-3.7 (0.62) 0.6 to -6.8	-3.0 (2.52) 1.6 to -8.2
Pacemaker Insertion	-2.0 (0.19) 0.2 to -4.3	-6.5 (0.49) -3.0 to -9.9	-1.6 (0.42) 4.2 to -7.2	0.7 (0.67) 4.2 to -0.6
GI Endoscopy	-0.5 (0.15) 3.7 to -3.6	-3.1 (0.30) 1.7 to -7.2	-4.2 (0.27) -0.4 to -8.2	-1.1 (0.36) 3.3 to -3.4
TURP	0.3 (0.13) 4.1 to -0.6	0.7 (0.37) 4.2 to -0.5	0.5 (0.20) 4.2 to -0.5	-0.2 (0.20) 0.0 to -0.6
Suprapubic Prostatectomy	0.4 (0.19) 4.1 to -0.6	1.4 (0.54) 4.2 to -0.5	0.7 (0.31) 4.2 to -0.5	-0.8 (1.29) 4.2 to -8.9
D&C	-11.5 (0.17) -7.6 to -13.7	-5.3 (0.42) 0.0 to -9.7	-3.2 (0.19) -0.5 to -5.6	-0.5 (0.19) 4.2 to -4.1
Carpal Tunnel Repair	-12.3 (0.18) -8.3 to -16.7	-2.7 (0.25) 0.0 to -5.3	-0.4 (0.22) 4.1 to -5.0	-0.4 (0.20) 4.0 to -3.3
Cataract Extraction	-2.2 (0.28) 0.6 to -6.8	-8.9 (0.23) -5.3 to -10.2	-1.0 (0.35) 4.0 to -3.4	-5.4 (0.44) -0.7 to -9.1

Source: Medicare Claims Data for Alabama, Arizona, Oklahoma and Oregon for physicians who performed at least one "overpriced" procedure in either year.

Notes: The Range is from the 10th to the 90 Percentiles.

APPENDIX A-2

CHARACTERISTICS OF PHYSICIANS PERFORMING OVERPRICED PROCEDURES

	TOTAL		ALABAMA		ARIZONA		OKLAHOMA		OREGON	
	#	%	#	%	#	%	#	%	#	%
Number of Physicians	3653	100%	1384	38%	728	20%	954	26%	587	16%
Board Certified	1412	39%	935	68%	116	16%	175	18%	186	32%
Foreign Medical Grad	149	4%	33	2%	24	3%	44	5%	48	8%
Age: Average	43		43		42		43		47	
Range 33-59	33-58		33-54		33-54		36-59			
Experience: Years Avg	18		18		16		17		21	
Range	6-32		6-31		6-26		6-28		8-32	
Participation Status										
Non-PAR	2105	58%	427	31%	496	68%	736	77%	446	76%
PAR	1342	37%	784	57%	222	30%	200	21%	136	23%
Part-PAR	236	6%	173	13%	40	5%	18	2%	5	1%
Group Status										
Solo	3426	94%	1157	84%	728	100%	954	100%	587	100%
Group Member	227	6%	227	16%	0	0%	0	0%	0	0%
Primary Specialty										
General Practice	156	4%	35	3%	17	2%	70	7%	34	6%
General Surgery	409	11%	186	13%	62	9%	102	11%	59	10%
Otolaryngology	108	3%	41	3%	24	3%	18	2%	25	4%
Cardiovascular Dx	110	3%	49	4%	19	3%	24	3%	18	3%
Family Practice	158	4%	51	4%	21	3%	65	7%	21	4%
Gastroenterology	127	3%	52	4%	32	4%	35	4%	8	1%
Internal Medicine	283	8%	117	8%	38	5%	89	9%	39	7%
Neuro Surgery	86	2%	40	3%	7	1%	15	2%	24	4%
OB/GYN	708	19%	261	19%	172	24%	183	19%	92	16%
Opthalmology	387	11%	131	9%	99	14%	83	9%	74	13%
Orthopedic Surgery	463	13%	189	14%	101	14%	82	9%	91	16%
Plastic Surgery	57	2%	17	1%	20	3%	8	1%	12	2%
Pulmonary Dx	97	3%	42	3%	29	4%	15	2%	11	2%
Thoracic Surgery	112	3%	56	4%	21	3%	29	3%	6	1%
Urology	316	9%	170	12%	51	7%	54	6%	41	7%
Hand Surgery	11	0%	1	0%	9	1%	1	0%	0	0%

Source: 1987 Medicare Carrier Claims Data: Arizona, Alabama, Oklahoma and Oregon for physicians who performed at least one "overpriced" procedure in either year.

Note: Specialties with 3 or fewer physicians are not displayed in the table.
The Range for Age and Experience is from the 10th to 90th percentile.

APPENDIX A-3

DISTRIBUTION OF NUMBER OF PROCEDURES ACROSS PHYSICIANS BY PROCEDURE AND STATE: 1987

PROCEDURE	ALABAMA	ARIZONA	OKLAHOMA	OREGON	COMBINED
	Mean				
Hip Replacement	5.2	4.7	4.6	3.8	4.7
(s.e.)	(0.36)	(0.65)	(0.50)	(0.35)	(0.23)
Range	1 to 11	1 to 10	1 to 10	1 to 8	1 to 10
Knee Arthroplasty	5.5	4.9	4.9	4.0	5.0
	(0.48)	(0.93)	(0.59)	(0.46)	(0.31)
	1 to 11	1 to 10	1 to 10	1 to 8	1 to 10
Knee Arthroscopy	3.5	3.4	3.3	3.1	3.3
	(0.30)	(0.46)	(0.47)	(0.43)	(0.20)
	1 to 7	1 to 6	1 to 8	1 to 7	1 to 7
Bronchoscopy	14.1	11.4	10.9	7.1	12.0
	(1.79)	(2.11)	(1.40)	(1.25)	(0.99)
	1 to 35	1 to 29	1 to 31	1 to 23	1 to 33
Pacemaker Insertion	7.5	5.8	8.4	4.7	7.2
	(0.65)	(0.86)	(0.78)	(1.18)	(0.42)
	1 to 19	1 to 12	1 to 17	1 to 9	1 to 17
Coronary Artery Bypass Graft	46.5	22.7	38.0	2.5	37.1
	(6.84)	(6.70)	(5.76)	(1.19)	(4.09)
	9 to 73	1 to 92	2 to 61	1 to 6	1 to 73
GI Endoscopy	45.5	28.9	35.3	20.4	37.1
	(3.77)	(3.42)	(3.54)	(2.78)	(2.1)
	1 to 140	1 to 88	1 to 111	1 to 50	1 to 114
TURP	27.1	27.8	24.5	31.3	27.2
	(1.43)	(2.77)	(2.22)	(3.14)	(1.1)
	9 to 48	6 to 53	3 to 47	7 to 61	6 to 53
Suprapubic Prostatectomy	1.8	1.6	2.2	1.25	1.9
	(0.16)	(0.30)	(0.53)	(0.25)	(0.18)
	1 to 3	1 to 4	1 to 4.5	1 to 2	1 to 3
D&C	2.2	2.2	2.0	2.1	2.1
	(0.10)	(0.13)	(0.11)	(0.22)	(0.06)
	1 to 4	1 to 5	1 to 4	1 to 5	1 to 4
Carpal Tunnel Repair	3.1	3.2	3.0	3.2	3.1
	(0.22)	(0.40)	(0.32)	(0.26)	(0.14)
	1 to 7	1 to 7	1 to 7	1 to 7	1 to 7
Cataract Extraction	119.7	64.0	123.3	60.2	95.5
	(16.90)	(5.53)	(15.99)	(6.54)	(7.1)
	6 to 236	7 to 153	7 to 233	6 to 148	7 to 200

Source: Medicare Claims Data for Alabama, Arizona, Oklahoma and Oregon for physicians who performed at least one "overpriced" procedure in either 1987/1988.

Notes: The Range is from the 10th to the 90 Percentiles.

APPENDIX A-4

AVERAGE CHANGE IN MEDICARE CASELOAD AND PAIRED t-TEST RESULTS BY STATE

PROCEDURE	ALABAMA	ARIZONA	OKLAHOMA	OREGON	COMBINED
Average Change	25.87	27.35	34.58	11.52	26.13
t-Statistic	8.36	11.87	13.81	6.04	17.95
p-Value	0.0001	0.0001	0.0001	0.0001	0.0001

Source: 1987 and 1988 Medicare Claims Data for Alabama, Arizona, Oklahoma and Oregon for physicians who performed an "overpriced" procedure in either year.

APPENDIX A-5

AVERAGE CHANGE IN MEDICARE CASELOAD BY 1987 SPECIALTY AND PAIRED t-TEST RESULTS

Specialty	Average Change	t-Statistic	p-Value	Number of Physicians
General Practice	12.2821	1.6653	0.0979	156
General Surgery	13.4059	4.9734	0.0001	409
Otolaryngology	21.9444	4.0655	0.0001	108
Cardiovascular Diseases	107.2091	4.7500	0.0001	110
Family Practice	30.2152	5.4906	0.0001	158
Gastroenterology	32.5276	6.6046	0.0001	127
Internal Medicine	40.1661	4.8397	0.0001	283
Neurological Surgery	1.3023	0.3382	0.7361	86
OB/GYN	7.7782	9.3129	0.0001	708
Ophthalmology	57.9561	9.1802	0.0001	387
Orthopedic Surgery	16.6955	6.0223	0.0001	463
Plastic Surgery	12.4386	3.3990	0.0013	57
Pulmonary Diseases	29.1340	4.0728	0.0001	97
Thoracic Surgery	11.1875	2.1601	0.0329	112
Urology	32.6957	7.2745	0.0001	253
Hand Surgery	37.0909	3.1093	0.0111	11

Source: 1987 and 1988 Medicare Claims Data for Alabama, Arizona, Oklahoma and Oregon for physicians who performed at least one "overpriced" procedure in either year.

APPENDIX A-6

AVERAGE CHANGE IN PROPORTION OF MEDICARE CASELOAD CLASSIFIED AS POOR AND NONWHITE BY 1987 SPECIALTY AND PAIRED t-TEST RESULTS

	PROPORTION OF PRACTICE: NONWHITE			PROPORTION OF PRACTICE: POOR		
Specialty	Avg Change	t-Statistic	p-Value	Avg. Change	t-Statistic	p-Value
General Practice	0.0026	1.3067	0.1932	-0.0071	-1.8033	0.0733
General Surgery	-0.0027	-1.2582	0.2090	-0.0049	-1.8603	0.0636
Otolaryngology	0.0004	0.1638	0.8702	0.0014	0.5803	0.5629
Cardiovascular Diseases	0.0018	0.6312	0.5292	-0.0010	-0.4741	0.6364
Family Practice	0.0005	0.2435	0.8080	-0.0063	-2.0022	0.0470
Gastroenterology	-0.0009	-0.2763	0.7828	-0.0011	-0.3344	0.7386
Internal Medicine	0.0019	0.0029	0.5131	-0.0061	-2.6552	0.0084
Neurological Surgery	0.0013	0.3528	0.7251	0.0082	1.8238	0.0717
OB/GYN	-0.0042	-1.2613	0.2076	0.0032	0.8168	0.4143
Ophthalmology	0.0029	3.0106	0.0028	-0.0008	-0.7003	0.4842
Orthopedic Surgery	-0.0006	-0.2633	0.7924	-0.0012	-0.5560	0.5785
Plastic Surgery	0.0046	0.9083	0.3676	-0.0075	-1.5064	0.1376
Pulmonary Diseases	0.0028	0.6662	0.5069	-0.0020	-0.5480	0.5850
Thoracic Surgery	0.0095	1.9947	0.0485	-0.0026	-0.8756	0.3831
Urology	0.0017	0.9629	0.3365	-0.0079	-1.7768	0.0768
Hand Surgery	0.0102	2.0140	0.0717	-0.0078	-1.0969	0.2984

Source: 1987 and 1988 Medicare Claims Data for Alabama, Arizona, Oklahoma and Oregon for physicians who performed at least one "overpriced" procedure in either year.

APPENDIX A-7

AVERAGE CHANGE IN MEDICARE REVENUE BY 1987 SPECIALTY AND PAIRED t-TEST RESULTS

Specialty	Average Change	t-Statistic	p-Value	Number of Physicians
General Practice	5592	5.1948	0.0001	156
General Surgery	7875	7.5629	0.0001	409
Otolaryngology	4294	4.1799	0.0001	108
Cardiovascular Diseases	3301	5.9555	0.0001	110
Family Practice	7999	6.8958	0.0001	158
Gastroenterology	1635	6.4771	0.0001	127
Internal Medicine	1439	8.2122	0.0001	283
Neurological Surgery	1429	0.5871	0.5587	86
OB/GYN	1174	5.4753	0.0001	708
Ophthalmology	8723	2.9891	0.0030	387
Orthopedic Surgery	6307	5.4759	0.0001	463
Plastic Surgery	4881	3.1142	0.0029	57
Pulmonary Diseases	8267	3.3622	0.0011	97
Thoracic Surgery	1442	3.1466	0.0021	112
Urology	1145	7.3061	0.0001	253
Hand Surgery	2037	2.4200	0.0361	11

Source: 1987 and 1988 Medicare Claims Data for Alabama, Arizona, Oklahoma and Oregon for physicians who performed at least one "overpriced" procedure in either year.

APPENDIX A-8

AVERAGE CHANGE IN SHARE OF MEDICARE REVENUE DERIVED FROM OVERPRICED PROCEDURE AND PAIRED t-TEST RESULTS

Procedure	Average Change	t-Statistic	p-Value	Number of Physicians
Hip replacement	-0.0186	-3.8396	0.0001	447
Knee Arthroplasty	-0.0001	-0.2139	0.8307	423
Knee Arthroscopy	-0.0115	-2.7647	0.0060	342
Bronchoscopy	-0.0013	-0.9385	0.3484	566
Coronary Artery Bypass Graft	0.0130	0.9402	0.3493	103
Pacemaker Insertion	-0.0068	-3.0474	0.0025	314
GI Endoscopy	-0.0006	-0.2560	0.7980	708
TURP	-0.0408	-7.3120	0.0001	288
Suprapubic Prostatectomy	-0.0058	-3.0366	0.0029	128
D&C	-0.0060	-1.6829	0.0927	1070
Carpal Tunnel Repair	-0.0009	-0.6932	0.4884	627
Cataract Extraction	-0.0124	-2.0307	0.0429	417

Source: 1987 and 1988 Medicare Claims Data for Alabama, Arizona, Oklahoma and Oregon for physicians who performed at least one "overpriced" procedure in either year.

APPENDIX A-9

AVERAGE CHANGE IN SHARE OF MEDICARE PRACTICE DERIVED FROM OTHER TYPES OF SERVICES AND PAIRED t-TEST RESULTS FOR PHYSICIANS WHO PERFORMED HIP REPLACEMENTS IN EITHER YEAR

Procedure Class	1987 Level	Average Change	Std Error	t-Statistic	p-Value
Assistant-at-Surgery	0.0488	0.0029	0.0022	1.3120	0.1902
Carpal Tunnel Repair	0.0091	0.0001	0.0007	1.2742	0.2033
Consultations	0.0155	0.0016	0.0016	0.9982	0.3187
Durable Medical Equipment	0.0055	0.0016	0.0004	4.3956	0.0001
Hip Replacements	0.1184	-0.0186	0.0048	-3.8396	0.0001
Hospital Visits	0.0382	-0.0042	0.0010	-4.2631	0.0001
Integumentary System	0.0080	0.0003	0.0008	0.3322	0.7399
Knee Arthroplasty	0.0934	0.0005	0.0037	0.1315	0.8955
Knee Arthroscopy	0.0256	-0.0031	0.0015	-2.0703	0.0390
Medical Visits	0.0864	0.0093	0.0021	4.4332	0.0001
Neurological Procedures	0.0215	0.0023	0.0016	1.4124	0.1585
Physician Assistant	0.0009	0.0023	0.0004	5.3639	0.0001
Orthopedic Procedures	0.4300	0.0020	0.0058	0.3422	0.7324
Radiology Procedures	0.0790	0.0023	0.0014	1.5930	0.1119
Special Tests	0.0092	0.0008	0.0001	0.7860	0.4323

Source: 1987 and 1988 Medicare Claims Data for Alabama, Arizona, Oklahoma and Oregon for physicians who performed at least one "overpriced" procedure in either year.

APPENDIX A-9

AVERAGE CHANGE IN MEDICARE SHARE OF PRACTICE DERIVED FROM OTHER TYPES OF SERVICES AND PAIRED t-TEST RESULTS FOR PHYSICIANS WHO PERFORMED CATARACT EXTRACTIONS IN EITHER YEAR

Procedure Class	1987 Level	Average Change	Std Error	t-Statistic	p-Value
Assistant-at-Surgery	0.0084	-0.0018	0.0009	-2.0934	0.0370
Anesthesia Services	0.0010	0.0005	0.0003	2.0717	0.0390
Cataract Extractions	0.5140	-0.0183	0.0060	-3.0613	0.0024
Consultations	0.0101	-0.0005	0.0009	-0.6036	0.5465
Other Eye Procedures	0.1685	0.0211	0.0038	5.5320	0.0001
Hospital Visits	0.0110	-0.0000	0.0003	-0.0948	0.9254
Laboratory Services	0.0025	-0.0001	0.0001	-2.0079	0.0454
Medical Visits	0.16660	0.0146	0.0040	3.6471	0.0003
Radiology Services	0.0480	-0.0106	0.0011	-9.2857	0.0001
Special Tests	0.0411	0.0014	0.0014	0.9544	0.3405
Medical Supplies	0.0181	-0.0072	0.0011	-6.2501	0.0001

Source: 1987 and 1988 Medicare Claims Data for Alabama, Arizona, Oklahoma and Oregon for physicians who performed at least one "overpriced" procedure in either year.

APPENDIX B

Chapter 4

Revised Urban Institute HCPC Classification Codes

(1) Evaluation and Management

M1A, Office Visits - New

90000-90020, 90757, 99201-99205, 99381-99387, 99432

M1B, Office Visits - Established

M0005-M0008, 90030-90080, 90750-90755, 90760-90774, 95115-95117, 99058, 99211-99215, 99391-99429, 99438

M2A, Hospital Visit - Initial

90200-90225, 99221-99223, 99431

M2B, Hospital Visit - Subsequent

M0021-M0023, M0029, M0590, 90240-90292, 98900-98912, 99150-99151, 99154-99156, 99231-99238, 99361-99362, 99433

M2C, Hospital Visit - Critical Care

94656-94662, 99152, 99160-99165, 99171-99174, 99291-99292, 99440

M3 , Emergency Room Visit

90500-90590, 99062-99065, 99175, 99281-99288, M0059

M4A, Home Visit

90100-90170, 99341-99353

M4B, Nursing Home Visit

M0039-M0049, 90300-90470, 99301-99333

M5A, Specialist - Pathology

88104-88162, 88172-88173, 88300-88309, 88321-88332, 88348

M5B, Specialist - Psychiatry

M0601, 90801-90862, 90880-90889, 90899

M5C, Specialist - Opthamology

92002-92260, 92283-92355

M5D, Specialist - Other

57410, 59800, 59810, 86077-86079, 90900-90915, 92502-92508, 92531-92534, 93660, 93797-93798, 95105, 95120-95180, 95831-95834, 95851-95857, 95880-95882, 97700-97721, 97752, 99065, 99178

M6 , Consultations

90600-90654, 99241-99275

A3A, Chiropractic

A2000

(2) Procedures

P1A, Major Procedure - Breast

19110-19112, 19161-19180, 19200-19240, 19316-19350, 19357-19380, 19499

P1B, Major Procedure - Colectomy

44140-44160

P1C, Major Procedure - Cholecystectomy

47600-47630

P1D, Major Procedure - TURP

52601, 52606-52640

P1E, Major Procedure - Hysterectomy

51925, 58150-58210, 58260-58285, 59525

P1F, Major Procedure - Explor/Decompr/Excis Disc

62295-62297, 62299-63011, 63015-63200, 63251

P1G, Major Procedure - Other

M0070, M0100, M0260, M0261, M0301, M0900, 11960-11971, 15120-15121, 15400, 15831-15839, 15933-15940, 15953, 15967, 15999, 19245-19310, 30150-30160, 30540-30545, 30999, 31002, 31040-31051, 31075-31090, 31225-31230, 31299-31500, 31580-31611, 31725-32545, 32800-32999, 33916, 36450-36455, 36500-36522, 36660, 37200-37204, 37788, 38100-38115, 38230-38241, 38380-38382, 38525, 38562-38564, 38720-38724, 38761-38780, 38794-39220, 39499-39599, 40700-40799, 40899, 41130-41155, 41252, 41599, 41870-41899, 42145-42150, 42200-42260, 42299, 42326, 42415-42426, 42510, 42820-42845, 42890-42894, 42953, 42961-43136, 43300-43325, 43330-43425, 43460-43520, 43605-43641, 43800-43825, 43840-44060, 44110-44131, 44300-44322, 44345-44346, 44400-44960, 45108-45160, 45540-45550, 45800-45825, 45999, 46700-46740, 46751, 46761-46762, 46999, 47001-47490, 47510-47511, 47700-49085, 49200-49255, 49421-49425, 49500, 49530-49535, 49565, 49580, 49600-49900, 49999-50010, 50045-50135, 50205-50380, 50395, 50400-50540, 50600-50660, 50700-50940, 51020-51597, 51800-51845, 51865, 51900-51920, 51940-51980, 53025, 53210-53215, 53415, 53443-53445, 53505, 53899-54000, 54111-54112, 54125-54135, 54300-54435, 54535-54661, 55110, 55200-55250, 55450, 55725-55865, 55899-55980, 56200, 56620-56710, 56800-57010, 57065, 57108-57120, 57135, 57200-57335, 57530-57556, 57700, 58140-58145, 58240, 58400-58825, 58920-58960, 58999, 59100-59140, 59160, 59350-59412, 59420-59521, 59540-59581, 59830, 59850-59852, 59899, 60220-60270, 60281, 61007, 61045, 61052-61055, 61105-62269, 62272, 62280, 62282, 62292-62294, 63012, 63210-63250, 63252-63688, 63700-63780, 64746-64771, 64792, 64804-64819, 64858-64870, 64999, 69155, 69300-69399,

P1G, Major Procedure - Other (continued)

69502-69610, 69662, 69710-69711, 69799-69930, 69950-69979, 71036-71037, 71090, 74327, 74350-74363, 74475-74486, 75894-75897, 75970-75971, 75980-76001, 76934-76935, 76944-76945, 90870-90872, 95920, 95961-95962

P2A, Major Procedure, Cardiovascular - CABG

33510-33530

P2B, Major Procedure, Cardiovascular - Aneurysm Repair

35081-35103

P2C, Major Procedure, Cardiovascular - Thromboendarterectomy

35301

P2D, Major Procedure, Cardiovascular - Coronary Angioplasty (PTCA)

92982-92984

P2E, Major Procedure, Cardiovascular - Pacemaker Insertion

33200-33248

P2F, Major Procedure, Cardiovascular - Other

33010-33130, 33250-33504, 33542-33915, 33930-35045, 35111-35286, 35311-35910, 36011-36015, 36216-36218, 36246-36248, 36260-36299, 36460, 36480-36481, 36488-36493, 36495-36497, 36530-36535, 36620-36640, 36800-37190, 37400-37606, 37615-37660, 75940-75969, 75972-75979, 76930-76933, 92950, 92970-92977, 92986-92990, 93501-93536, 93561-93631, 93650

P3A, Major Procedure - Orthopedic - Hip Fracture Repair

27232-27236, 27240-27244, 27248

P3B, Major Procedure - Orthopedic - Hip Replacement

27125-27138

P3C, Major Procedure - Orthopedic - Knee Replacement

27440-27447

P3D, Major Procedure - Orthopedic - Other

20661, 20693, 20802-20910, 20924, 20999, 21015-21032, 21041, 21045, 21070-21071, 21089, 21120-21299, 21339, 21343-21347, 21385-21445, 21454-21470, 21493, 21499, 21557, 21615-21741, 21805-21899, 21935, 22100-22379, 22548-22899, 22910-22999, 23036, 23077, 23105-23125, 23145-23146, 23155-23156, 23190-23222, 23332, 23395-23400, 23410-23491, 23530-23532, 23550-23552, 23580-23585, 23615, 23680, 23800-23921, 23931, 24077, 24102, 24150-24153, 24305, 24360-24410, 24430-24435, 24495-24498, 24515, 24545, 24575, 24579, 24587-24588, 24635, 24660, 24800-24999, 25031, 25077, 25105, 25115-25119, 25170, 25250-25251, 25330-25375, 25400-25449, 25490-25492, 25676, 25800-25999, 26037, 26117, 26121, 26123, 26125, 26130, 26260, 26357, 26415-26416, 26437, 26478-26479, 26499, 26504, 26527, 26548-26550, 26560-26565, 26580-26597, 26615, 26850-26852, 26992, 27001, 27005-27030, 27033, 27049-27062, 27066-27079, 27090-27091, 27097-27122, 27140-27170, 27177-27187, 27192, 27212-27225, 27253-27255, 27258-27266, 27280-27299, 27311, 27329, 27331-27335, 27350, 27356-27358, 27365, 27380-27386, 27394-27395, 27403-27424, 27427-27435, 27437-27438, 27448-27495, 27502-27506, 27510-27514, 27517-27519, 27524, 27536-27537, 27540, 27554-27557, 27566, 27580-27602, 27604, 27615, 27625-27626, 27645-27647, 27687, 27695-27758, 27762, 27788, 27806, 27810-27814, 27818-27823, 27832, 27870-28001, 28020-28024, 28046, 28052-28054, 28070, 28100, 28104-28106, 28108-28109, 28116, 28119, 28123-28130, 28153, 28236-28238, 28262, 28288, 28299-28305, 28307, 28309, 28313, 28340-28360, 28410-28415, 28440-28445, 28460, 28480, 28550, 28580, 28610, 28640, 28675-28740, 28800-28810, 28899

P4A, Eye Procedures - Corneal transplant

65710-65770

P4B, Eye Procedures - Cataract Rem/Lens Ins

66830-66945, 66983-66986

P4C, Eye Procedures - Retinal Detachment

67101, 67103-67112, 67120, 67141-67145

P4D, Eye Procedures - Treatment of Retinal Lesions

67208-67224, 67227-67228

P4E, Eye - Other

65091-65175, 65230-65235, 65245-65285, 65290-65426, 65710-65770, 65771-65815, 65850-66821, 66980, 69999-67040, 67102, 67115, 67121, 67146, 67226, 67250-67599, 67715, 67801-67808, 67830-67835, 67880-67914, 67916-67921, 67923-67935, 67950-67999, 68130, 68320-68399, 68500-68520, 68540-68700, 68720-68750, 68830, 68899

P5A, Ambulatory Procedures - Skin

10141, 11042-11044, 11200-11201, 11401-11406, 11421-11426, 11441-11446, 11471-11646, 11750, 11770-11772, 12006-12007, 12017-12018, 12036-12037, 12046-12047, 12056-12057, 13101, 13121, 13132, 13152, 13300, 14001-14021, 14041-15101, 15200-15350, 15410-15770, 15840-15851, 15876-15931, 15941-15952, 15954-15966, 15970-15983, 16010-16015, 17106-17108, 17260-17286, 96910-96913

P5B, Ambulatory Procedures - Musculoskeletal

20005, 20205, 20225-20251, 20525, 20650-20660, 20662-20665, 20680, 20694, 20912-20922, 20926, 20955-20973, 20975, 21010-21011, 21034-21040, 21044, 21050-21061, 21100, 21310-21335, 21338, 21340, 21355-21365, 21450-21453, 21480-21490, 21494-21495, 21501-21511, 21555-21556, 21600-21610, 21750, 22505, 22900, 23000-23030, 23035, 23040-23044, 23066, 23076, 23100-23101, 23130-23140, 23150, 23170-23185, 23331, 23405-23406, 23505, 23515, 23605-23610, 23625-23630, 23655-23675, 23700, 23930, 23935-24001, 24075-24076, 24100-24101, 24105-24148, 24155-24164, 24201, 24301, 24310-24356, 24420, 24470, 24505-24510, 24530-24542, 24565-24570, 24577-24578, 24580-24586, 24605-24625, 24655, 24665-24666, 24675-24700, 25000-25028, 25035-25041, 25066, 25076, 25085-25101, 25107-25112, 25120-25153, 25210-25240, 25248, 25260-25320, 25390-36393, 25450-25455, 25505-25515, 25535-25545, 25565-25575, 25605-25620, 25626-25628, 25635-25645, 25660-25675, 25680-25700, 26011-26035, 26040-26116, 26120, 26122, 26124, 26126-26128, 26135-26235, 26250-26255, 26261, 26350-26356, 26358-26412, 26418-26434, 26440-26447, 26480-26498, 26500-26502, 26508-26525, 26530-26545, 26552-26559, 26567-26574, 26605-26610, 26645-26665, 26675-26686, 26705-26715, 26727-26735, 26744-26746, 26765, 26775, 26780-26844, 26860-26952, 26990-26991, 26995-27000, 27002-27004, 27031, 27035-27048, 27065, 27080, 27087-27088, 27196, 27201-27202, 27252, 27257, 27275, 27301-27310, 27315-27320, 27324-27328, 27330, 27345, 27355, 27372, 27390-27393, 27396-27400, 27425, 27522, 27532-27534, 27552, 27562-27564, 27570, 27603, 27605-27612, 27620, 27630-27641, 27650-27686, 27690-27692, 27764-27766, 27781-27784, 27790-27792, 27802-27804, 27831, 27842-27848, 27860, 28002-28011, 28030-28035, 28045, 28050, 28062, 28072-28092, 28102-28103, 28107, 28110-28114, 28118, 28120-28122, 28135-28140, 28171-28175, 28193-28210, 28222-28234, 28240-28261, 28264-28272, 28285-28286, 28290-28298, 28306, 28308, 28310-28312, 28315-28322, 28405-28406, 28420, 28435-28436, 28465, 28485, 28500-28505, 28520-28525, 28545-28546, 28555, 28575, 28585, 28605-28606, 28615, 28635, 28645, 28665-28670, 28750-28760, 28820-28825

P5C, Ambulatory Procedures - Inguinal Hernia Repair

49505-49525, 49550-49555

P5D, Ambulatory Procedures - Lithotripsy

50590

P5E, Ambulatory Procedures - Other

19020, 19101, 19120-19160, 19182, 19355, 30115-30118, 30125-30140, 30310-30520, 30580-30630, 30915-30920, 31020-31033, 31070, 31200-31205, 31612-31614, 31700, 31717-31720, 37609, 37700-37787, 38305-38308, 38500, 38510-38520, 38530-38555, 38700-38701, 38740-38760, 40500-40650, 40654, 40801, 40805, 40814-40818, 40831-40845, 41000-41005, 41100-41105, 41114-41120, 41251, 41806, 41826-41827, 42000, 42104-42140, 42182, 42305, 42320-42325,

P5E, Ambulatory Procedures - Other (Cont.)

42335-42340, 42408, 42410, 42440-42509, 42600, 42665-42699, 42720-42725, 42806-42808, 42810-42815, 42860-42880, 42900-42950, 42955, 43246, 43326, 43450-43456, 43750, 43830-43832, 44340, 45000-45020, 45170-45181, 45500-45505, 45521, 45560, 45900-45915, 46000, 46032-46045, 46060, 46080, 46200, 46211, 46250-46285, 46530, 46750, 46753-46760, 46924, 46937-46938, 47000, 49400-49420, 49426, 49501, 49540, 49560, 49570-49575, 49581-49590, 50020-50040, 50200, 50390-50393, 50396-50398, 50974-50980, 51005-51010, 51710, 52500, 52650-52700, 53000-53021, 53040, 53220-53240, 53265, 53275-53410, 53420-53440, 53447, 53502, 53510-53621, 53660-53665, 54001-54015, 54110, 54115-54120, 54152-54154, 54161, 54205-54220, 54440, 54505-54530, 54670-54700, 54820-54901, 55040-55060, 55120-55180, 55400-55401, 55500-55540, 55605-55680,55705-55720, 56000, 56440, 56515, 56740, 57020, 57105, 57130, 57400, 57520, 57720, 57820, 58120, 58320, 58350, 58900, 58970, 58974-58976, 59320-59325, 59801, 59811-59821, 59840-59841, 59870, 60200, 60280, 61020-61026, 61050, 61070, 62270, 62273-62279, 62281, 62287-62289, 62298, 64408-64410, 64415-64417, 64420-64421, 64430, 64442-64443, 64510-64530, 64600-64610, 64622-64630, 64702-64744, 64772-64790, 64795-64803, 64830-64857, 64872-64907, 69405-69150, 69205, 69420-69421, 69436-69501, 69620-69661, 69666-69700, 69720-69745, 74283, 76003, 76938-76943, 76946-76949, 77610-77615, 79000-79030, 79100, 79300-79440, 88000-88045, 88171, 92960, 99180-99182

P6A, Minor Procedures - Skin

10000-10140, 10160-11041, 11050-11101, 11400, 11420, 11440, 11450-11470, 11700-11740, 11752-11765, 11900-11954, 11975-12005, 12011-12016, 12020-12035, 12041-12045, 12051-12055, 13100, 13120, 13131, 13150-13151, 13160, 14000, 14040, 15775-15829, 15852-15875, 16000, 16020-17105, 17110-17250, 17300-17999, 36468-36469, 96999

P6B, Minor Procedures-Musculoskeletal

20000, 20010-20200, 20206-20220, 20500, 20520, 20550-20615, 20670, 20690-20692, 20950, 20974, 20976, 21079-21088, 21110, 21300, 21337, 21550, 21800, 21920-21930, 22010-22033, 23031, 23065, 23075, 23330, 23500, 23510, 23520-23525, 23540-23545, 23570-23575, 23600, 23620, 23650, 24065-24066, 24200, 24500, 24560, 24576, 24600, 24640-24650, 24670, 25065, 25075, 27175-27176, 27190-27191, 27195, 27200, 27210-27211, 27230, 27238, 27246, 27250, 27256, 27323, 27340, 27500, 27508, 27516, 27520, 27530, 27538, 27550, 27560, 27613-27614, 27618-27619, 27760, 27780, 27786, 27800, 27808, 27816, 27830, 27840, 28043, 28060, 28150, 28160, 28190-28192, 28220, 28280, 28400, 28430, 28450-28456, 28470-28476, 28490-28496, 28510-28515, 28530-28540, 28570, 28600, 28630, 28660, 29000-29799, 36680

P6C, Minor Procedures - Other

M0101, M0702-M0730, M0910, M0994, 19000-19001, 19030-19100, 19396, 30000-30111, 30120-30124, 30200-30300, 30560, 30800-30906, 31000-31001, 31502, 36400-36410, 36420-36440, 36470-36471, 36485, 36494, 36600, 38300, 38505, 40490, 40652, 40800, 40804, 40806-40812, 40819-40830, 41006-41018, 41108-41113, 41250, 41500-41520, 41800-41805, 41820-41825, 41828-41850, 42100, 42160-42180, 42280-42281, 42300, 42310, 42330, 42400-42405, 42650-42660, 42700, 42800-42804, 42809, 42960, 43600, 43760-43765, 44100, 45100-45105, 45520, 46030, 46050, 46070, 46083, 46210, 46220-46230, 46320-46510, 46900-46922, 46930-46936, 46940-46946,

P6C, Minor Procedures - Other (cont.)

47525-47530, 49180, 50686-50688, 51000, 51700-51705, 51725-51797, 51860, 51880, 52450, 52510, 53060-53200, 53250-53260, 53270, 53442, 53640, 53670-53675, 54050-54105, 54150, 54160, 54200, 54235, 54250, 54450-54500, 54800, 55000, 55100, 55600-55601, 55700, 55870, 56100, 56400-56420, 56441-56510, 56600, 56720, 57050-57063, 57100, 57150-57180, 57500-57513, 57600-57620, 57800, 58100-58103, 58972, 59000-59050, 59200-59305, 59414, 60000-60100, 64400-64405, 64412-64413, 64418, 64425, 64435-64441, 64445-64508, 64550-64595, 64612-64620, 64640-64680, 65205-65222, 65240, 65286, 65430-65600, 65820-65830, 67700-67710, 67800, 67810-67825, 67840-67875, 67915, 67922, 67938, 68020-68115, 68135-38200, 68400-68440, 68525-68530, 68705, 58760-68825, 68840, 69000-69100, 69200, 69210-69223, 69400-69410, 69424-69434, 69611, 74235, 76970, 85060-85109, 85667, 86128-86130, 86342, 86404, 88170, 89100-89105, 89350, 90701-90749, 90780-90788, 90798-90799, 91000, 91055-91060, 91100-91105, 92275, 92358-92371, 92538, 92953, 94640-94652, 94664-94668, 95829-95830, 95860-95875, 95954-95958, 96900, 97010-97541, 97740-97741, 97799, 99170, 99185-99195

P7A, Oncology - Radiation Therapy

76950-76960, 77261-77499, 77750-77799, 79035, 79200, 79900

P7B, Oncology - Other

M0024, M0072, M0080, 51720, 77600-77605, 77620, 90790-90791, 96400-96545

P8A, Endoscopy - Arthroscopy

29800-29898

P8B, Endoscopy - Upper G.I.

43200-43245, 43247-43272

P8C, Endoscopy - Sigmoidoscopy

45300-45337

P8D, Endoscopy - Colonoscopy

44388-44393, 45355-45385

P8E, Endoscopy - Cystoscopy

52000-52340

P8F, Endoscopy - Bronchoscopy

31615-31651, 31659

P8G, Endoscopy - Laparoscopic Cholecystectomy

49310-49311

P8H, Endoscopy, Laryngoscopy

31505-31579

P8I, Endoscopy, Other

23356, 27373-27379, 27436, 27851-27853, 31071, 31250-31285, 32700-32705, 39400, 43834, 44360-44386, 45386, 46600-46614, 47550-47556, 49300-49303, 50550-50580, 50951-50972, 52605, 52800-52805, 57450-57454, 58980-58996, 59150-59151, 74328-37340, 92511

T2A, Other Tests - Electrocardiograms

93000-93014, 93040-93045

T2B, Other Tests - Cardiovascular Stress Tests

93350

T2C, Other Tests - EKG Monitoring

Q0019-Q0032, 93224-93237, 93258-93278

A1 , Anesthesia

00100-01999, 99100-99140

(3) Imaging

I1A, Standard Imaging - Chest

71010-71035

I1B, Standard Imaging - Musculoskeletal

70100-70130, 70140-70160, 70250-70260, 71100-71130, 72010-72120, 72170-72190, 72200-72220, 73000-73140, 73500-73630, 76020-76066

I1C, Standard Imaging - Breast

76086-76098

I1D, Standard Imaging - Contrast G.I.

74210-74230, 74240-74270, 74280, 76010

I1E, Standard Imaging - Nuclear Medicine

78000-78220, 78223-78232, 78258-78407, 78411-78412, 78414-78999, 79999

I1F, Standard Imaging - Other

R0070-R0075, 20501, 21116, 23350, 24220, 25246, 27093-27095, 27370, 27648, 31708, 36000-36001, 38790-38791, 42550, 50394, 50684, 50690, 51600-51610, 54230, 55300, 58340, 68850, 70030-70050, 70134, 70170-70240, 70300-70333, 70350-70391, 71000, 71038-71061, 73650-73660, 74000-74022, 74285-74315, 74400-74456, 74710-74775, 76080-76081, 76100-76350, 76499, 93280

I2A, Advanced Imaging - CAT: Head

70450-70482

I2B, Advanced Imaging - CAT: Other

R0065, 70486-70492, 71250-71270, 72125-72133, 72192-72194, 73200-73202, 73700-73702, 74150-74170, 76070, 76355-76380

I2C, Advanced Imaging - MRI: Brain

70550-70553

I2D, Advanced Imaging - MRI: Other

70336, 70540, 71550, 72140-72158, 72196, 73220-73221, 73720-73721, 74181, 75552, 76400

I3A, Echography - Eye

76511-76530

I3B, Echography - Abdomen/Pelvis

76700-76778, 76805-76857

I3C, Echography - Heart

76620-76632, 93300-93325

I3D, Echography - Carotid Arteries

93870, 93880-93882

I3E, Echography - Prostate, Tranarectal

76872

I3F, Echography - Other

76500-76506, 76535-76604, 76640-76645, 76800, 76870, 76880, 76925-76926, 76986-76999, 93925-93931, 93970-93979

I4A, Imaging/Procedure - Heart,Inc Cardiac Cath

75500-75528, 75750-75767, 93541-93553

I4B, Imaging/Procedure - Other

31656, 31710-31715, 36010, 36100-36215, 36220-36245, 36250, 38200, 47500, 62284, 62290-62291, 70010-70020, 72240-72296, 74320-74321, 74470-74471, 75600-75748, 75772-75893, 75898, 78221, 78240, 78409, 78413

APPENDIX C

CHAPTER 5

LIST OF PROCEDURES

CATEGORY		CODE RANGE	NOTES
1.	Percutaneous Transluminal Coronary Angioplasty	36.0	until 10/1/86
		36.01,36.02	as of 10/1/86
		36.05	as of 10/1/87
		36.01	
		36.02	
*2.	Coronary Artery Bypass Graft	106, 107	DRGs
*3.	Cardiac Catheterization	37.21-37.23	
*4.	Permanent Cardiac Pacemaker Implantation	37.71-37.77	
*5.	Carotid Endarterectomy	38.12	
*6.	Partial Excision of the Large Bowel	45.7-45.79	
		45.93	
		45.94	
*7.	Cholecystectomy	51.21-51.22	
*8.	Repair of Inguinal Hernia	53.0-53.17	
*9.	Prostatectomy	60.2-60.6	
*10.	Hysterectomy	68.4-68.7	
*11.	Total Hip Replacement	81.5-81.59	until 10/1/89
		81.51	as of 10/1/89
12.	Reduction of Fracture of the Femur	79.05	
		79.15	
		79.25	
		79.35	

LIST OF PROCEDURES (Continued)

CATEGORY	CODE RANGE	NOTES
*13. Other Arthroplasty of the Hip	81.6-81.69	until 10/1/89
	81.52	as of 10/1/89
*14. Total Knee Replacement	81.41	until 10/1/89
	81.54	as of 10/1/89
*15. Mastectomy - All	85.41-85.48	
	85.20	
	85.22-85.23	
*16. Partial Mastectomy	85.20	
	85.22-85.23	
*17. Simple and Radical Mastectomy	85.41-85.48	
*18. Back Procedures - All	03.09	
	80.5-80.59	
	81.0-81.09	
*19. Laminectomy	03.09	
*20. Excision of Disk	80.5-80.59	
*21. Spinal Fusion	81.0-81.09	
*22. Appendectomy	47.0	
23. Incidental Appendectomy	47.1	

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* Overpriced procedures already subject to reduction in payments prior to the 1992 payment reform

LIST OF MEDICAL CONDITIONS

CATEGORY		CODE RANGE	NOTES
1.	Heart Diseases - All	391-392.0 393-398.99 402-402.9 404-404.9 410-429.9	
2.	Ischemic Heart Disease	410-414.9	
3.	Acute Myocardial Infarction	410-410.9	
4.	Congestive Heart Failure	428-428.9	
5.	Hypertension	401-401.9	
6.	Cancers		
	- malignant	140-208.9	
	- in situ	230-234.9	
7.	Breast		
	-malignant	174-175.9	
	-in situ	233.0	
8.	Cervix		
	-malignant	180-180.9	
	-in situ	233.1	
9.	Colon and Rectum		
	- malignant	153-154.1 154.8	
	- in situ	230.3-230.5	
10.	Liver 155-155.2		
11.	Prostate		
	-malignant	185	
	-in situ	233.4	

LIST OF MEDICAL CONDITIONS (Contined)

CATEGORY	CODE RANGE	NOTES
12. Bronchus and Lung		
- malignant	162.2-162.9	
- in situ	231.2	
13. Stroke		430-432.9
	433.0	
	434-434.9	
	436	
14. Transient Ischemic Attack	435.0-435.9	
15. Pneumonia and Influenza	480-487.8	
16. Diseases of the Gallbladder	574-576.9	
17. Hernia of Abdominal Cavity	550-553.9	
18. Fracture of the Neck of the Femur	820-820.9	
19. Septicemia and Bacteremia	038-038.9	
	112.5	
20. Septicemia only	038-038.9	
21. Bacteremia only	112.5	
22. Diabetes Mellitus	250.0-250.9	
23. Diabetic ketoacidosis		
with and without coma	250.1	
	250.3	
24. Hypoglycemia with coma and Unspecified	251.0	
	251.2	

LIST OF MEDICAL CONDITIONS (Contined)

CATEGORY	**CODE RANGE**	**NOTES**
25. Chronic Obstructive Pulmonary Disease	491.0-491.9 492.0-492.8 493.0-493.9 496	
26. Chronic Bronchitis	491.0-491.9	
27. Emphysema	492.0-492.8	
28. Asthma	493.0-493.9	
29. Chronic Airway Obstruction, COPD, NOS	496	

APPENDIX D

CHAPTER 5

INTRODUCTION

Monitoring trends in hospitalizations for specific medical conditions and surgical procedures will complement information obtained from monitoring Part B claims data. Analysis of hospitalization information from before, during and after physician payment reform may help identify changes in access to certain physician services or changes unrelated to access but to other characteristics of the health care system.

Changes in rates of hospitalization for specific surgical procedures will be monitored. Admission for surgical procedures such as coronary artery bypass graft and hip replacement are usually arranged via referral from primary care physicians to specialists, who are the ultimate decisionmakers regarding patients selected for these procedures. Changes in the rates of these procedures may suggest that problems in obtaining access to physicians exist. It must be kept in mind that such information would not provide evidence about causality but would highlight areas that require more indepth analyses to ascertain why a change occurred.

As noted in this chapter's overview, surgical procedures were initially reviewed based on four criteria: those that had stable discharge rates; those that experienced modest to major increases in rates; those that had undergone changes in the method or location of clinical treatment; and those that had an alternative procedure available as a treatment option. Twenty-three procedures were reviewed, and five were analyzed for presentation in this Appendix. Payments for several of the procedures on this list were reduced between 1988 and 1990 as overpriced procedures (see Appendix C). Analyzing changes in the rates for these procedures may be more challenging because of the difficulty in distinguishing between secular trends (including technology diffusion), overpriced procedure reductions, and the effect of payment reform.

The criteria for selecting the 29 medical conditions to be monitored were: 1) sentinel conditions; and 2) chronic medical conditions with high rates of incidence or prevalence in the elderly Medicare population. Sentinel events are those medical conditions for which hospitalization can serve as an indicator of lack of access to outpatient care or failure to properly manage a patient in an ambulatory setting. Twenty-nine medical conditions were initially reviewed, and data were analyzed for five. The full list of conditions and procedures to be monitored is shown in Appendix C.

For this report to Congress the five procedures selected were: percutaneous transluminal coronary angioplasty (PTCA), coronary artery bypass graft (CABG), total knee replacement, prostatectomy, and mastectomy in women. The five medical conditions selected were: diabetic ketoacidosis, hypertension, congestive heart failure, asthma and transient ischemic attack. For each procedure or condition, national trends in hospitalization rates and 30-day post-admission death rates for the elderly Medicare beneficiary population and among demographic groups of this population during the period 1986-1990 are presented. Cross-sectional data for the year 1990 are also presented.

METHODS

Selection of Procedures and Conditions

The source of inpatient hospital data for the study was the HCFA Medicare Provider Analysis and Review (MEDPAR) file for the years 1986 through 1990. This file contains summarized records of hospitalization claims for Medicare beneficiaries including up to five diagnosis and up to three procedure codes, as well as demographic data and date of death (if applicable). The file was searched for all admissions for beneficiaries 65 years of age and older who had one of the conditions of interest listed as the principal diagnosis or one of the procedures of interest listed in any of the three procedure positions contained in the record. For one procedure, CABG, the diagnostic related group (DRG) code was used to select cases. All records for members of Health Maintenance Organizations (HMO) were eliminated because the reporting of hospitalizations of HMO members was incomplete.

As noted above, for medical conditions, cases were selected where the diagnostic code was the principal diagnosis. The principal diagnosis is defined by HCFA as the reason for the hospitalization. The focus in the analysis was discharges rather than persons discharged.

In this study, geographic area is based on whether a beneficiary resided in a metropolitan statistical area (MSA) or non-MSA area. It does not indicate if the hospital providing care was in an urban or rural setting.

Calculation of Rates

The 1986-1990 rates of hospitalization and of surgery were calculated using the cases defined above and a denominator created from the HCFA enrollment files. The denominator was the number of person years of non-HMO enrollment for all Medicare beneficiaries age 65 and older who were residents of the 50 States and the District of Columbia. This denominator was subdivided in order to calculate rates for each race, sex, and age group and geographic area.

The date of death contained on the MEDPAR record was used to calculate the 30-day post-admission mortality rate for those beneficiaries who died during or after a hospitalization. For persons who had more than one admission in the 30 day period prior to death, the death was attributed to the study procedures and diagnoses listed for the last admission.

Cross-sectional Analysis

Table 1 contains the number of discharges per 1,000 elderly Medicare beneficiaries and the number of deaths per 1,000 discharges for each of the five procedures and conditions for the years 1986-1990. The average annual percent change reflects the change between 1986 and 1990 divided by the number of increments. The rates in Table 1 are not adjusted and therefore are not identical to the rates in Table 2.

Subsequently, each procedure or medical condition is discussed in a separate section. Table 2 in each section presents discharge rates and 30-day post-admission mortality rates for 1990 for a particular condition or procedure. In order to permit comparison of rates within demographic or geographic groups, rate ratios and confidence intervals for the 1990 discharge and 30-day post-admission mortality rates were calculated by the method of Kleinbaum, Kupper, and Morgenstern, using SAS statistical software. Rates for all beneficiaries and for race-sex groups were age-adjusted by the direct method using the 1986 Medicare population as the standard.

Trend Analysis

For each of the procedures and conditions, figures are presented that contain 1986-90 discharge and 30-day post admission mortality rates by race-sex groups, (figures 1 and 2), by age group, (figures 3 and 4), and by geographic area, (figures 5 and 6). Trend analyses were conducted on the rates using weighted least squares regression (again using SAS statistical software). For each procedure or condition, Table 2 contains the results of the analysis. Two types of trend analysis were performed. Overall trend analysis was used to determine whether the rates for procedures or conditions were moving upward or downward from 1986 to 1990. The model developed for this analysis produces the slope of a regression line fitted to the available data points for each demographic or geographic group. A second type of trend analysis was performed to test for differences in trends between demographic and geographic groups.

In the overall trends analysis, the dependent variables were discharge or mortality rates for all beneficiaries and for specific race-sex, age, and geographic area groups. Rates for race-sex groups were age-adjusted using 1986 population or discharge counts as the respective standard populations. Independent variables were year, demographic group, and an interaction term between year and demographic group. The model estimating rates for all beneficiaries did not contain the demographic group or interaction terms.

During preliminary analysis, it was observed that the rates for the year 1989 deviated from the trend for many conditions and procedures. For most of these procedures or conditions, rates for the year 1990 appeared to revert to whatever trend was occurring prior to 1989. This change in rates for 1989 was also found when all discharges were considered together. The change in 1989 rates may reflect changes in utilization as a result of the Medicare Catastrophic Coverage Act which was in effect only during 1989. For this reason, an additional dummy variable for 1989 was used in all models to correct for any changes in rates that occurred in that year.

The model for the overall trends analysis took the following form:

Y(rate) = b0 + b1(year) + b2(1989 dummy) + b3(group) + b4(year*group) + error

where b0 = the intercept for the reference group (baseline group against which other groups are compared)

b1 = the slope of the reference group

b2 = coefficient of the 1989 dummy (1 for 1989, 0 for all other years)

b3 = coefficient of the demographic or geographic group

b4 = coefficient of the interaction term

Separate regressions were estimated for all beneficiaries and for each demographic and geographic group. The column labeled "5 yr Slope" on Table 2 contains the slopes of the regression lines. To test the significance of the slopes, a t-test was used. The null hypothesis for the t-test was that the reference group slope (b1) was not significantly different from zero. Significant results of the t-tests of the slope coefficients are shown next to the column of slopes.

The within group trends analysis involved making comparisons of the trends in the rates of demographic or geographic group members. For demographic groups, a model was developed containing independent variables for both demographic categories (race-sex, and age), as well as interaction terms for each group and year. The interaction terms permit comparisons of the slopes of trend lines of group members to a reference group. Because demographic characteristics were not available for geographic areas, the interaction term (year*group) contained in the model developed for the overall trends analysis was used to test for differences in the trends between the MSA and non-MSA groups.

The model for the within group trends analysis of demographic groups took the following form:

$$
\begin{aligned}
Y(\text{rate}) = \quad & b0 + b1(\text{year}) + b2(\text{1989 dummy}) + \\
& b3(\text{white female}) + b4(\text{year*white female}) + b5(\text{black male}) + \\
& b6(\text{year*black male}) + b7(\text{black female}) + b8(\text{year*black female}) + \\
& b9(\text{age 75-84}) + b10(\text{year*age 75-84}) + \\
& b11(\text{age 85+}) + b12(\text{year*age 85+}) + \text{error}
\end{aligned}
$$

The column labeled "Difference in Slopes" on Table 2 reports the results of the within group comparisons of trends. The test of the interaction term coefficients is a test of the null hypothesis that there is no difference between the slopes of group members and the respective reference groups (i.e. white-male vs. white-female, age 65-74 vs. age 75-84, etc.) after controlling for the contributions of the other groups. That is, rejection of the null hypothesis implies that the adjusted trend line for one group is significantly different from the adjusted trend line of the reference group.

Limitations and Strengths of the Analysis

The data on which the analysis is based were grouped from records of individual beneficiaries. It is therefore likely that some of the statistical tests would result in different conclusions if ungrouped or individual level data were used. The use of the interaction terms represents an effort to improve the statistical reliability of the data by combining records for demographic and geographic groups. However, the data still represent grouped information, not individual beneficiary discharge records.

A second limitation is the use of a common format to conduct analyses of 10 different procedures and conditions. While the use of such a format helps improve comparability of the results, studies of the individual procedures or conditions would likely dictate specific methodologic considerations that could not be taken into account without confusing the reader. Moreover, such analyses would take a much longer time to accomplish than more general studies such as this one.

There are several important strengths to this study. The data that were analyzed represent 100 percent of the hospitalizations for elderly non-HMO Medicare beneficiaries. Approximately 10 million hospital discharge records per year were available for analysis. In addition to the large numbers of hospital records involved, the study included a denominator of non-HMO Medicare beneficiaries. The similarities in the way in which both numerator cases and denominator records were selected increases the accuracy of the rates derived from the data. In addition, the rates can be assumed to represent the U.S. elderly population as a whole because Medicare covers over 95 percent of persons age 65 and older.

While the quality of Medicare hospitalization data used in the present study is generally good, new methods of claims processing are leading to improved data quality and more timely availability of data for analysis. In addition, more detailed clinical data elements are becoming available. The potential therefore exists to conduct more informative longitudinal studies in the future.

RESULTS

Table 1 contains the discharge rates and 30-day post-admission mortality rates for 1986-1990 and the average annual percent change for the five procedures and five conditions. The discharge rates for all of the procedures increased during the 5 year period except for prostatectomy, which showed a slight decrease. The percent of increase for the procedures varied widely, with PTCA (41.0 percent) and total knee replacement (13.4 percent) registering the greatest increases.

It is noteworthy that for all procedures except total knee replacement, the 30-day post-admission morality rates decreased over the 5 year period. The two revascularization procedures, CABG and PTCA, which had the highest 30-day post-admission mortality rates, showed the largest decreases over time.

The discharge rates for four of the five medical conditions decreased over the 5 year period. The exception was congestive heart failure, which had a 1.2 percent increase in the rate of discharges. With the exception of asthma, the 30-day post-admission mortality rates also declined, from 2.4 to 7.2 percent.

A detailed discussion of the trends in the discharge rates and the 30-day post-admission mortality rates for each of the procedures and conditions is provided in the following section. The discussion includes analyses by demographic and geographic groups. As noted earlier, the same type of data are available for future study for the 23 procedures and 29 conditions.

Table 1. Number of discharges per 1,000 elderly Medicare beneficiaries and 30-day post-admission deaths per 1,000 discharges, for selected procedures and conditions, U.S., 1986-90

	Discharge Rates						30-day Post-admission Mortality Rates					
	1986	1987	1988	1989	1990	Average Annual % Change	1986	1987	1988	1989	1990	Average Annual % Change
Procedure 1/												
PTCA	1.33	1.97	2.53	2.86	3.51	41.0	35.57	35.98	30.67	27.80	24.85	-7.5
CABG	2.72	3.19	3.46	3.04	3.41	6.3	58.29	56.87	51.59	31.47	31.72	-11.4
Total Knee Replacement	2.02	2.31	2.61	2.74	3.10	13.4	4.87	5.90	5.14	5.38	5.05	0.9
Mastectomy in Women	3.37	3.69	3.82	3.47	3.48	0.8	4.73	4.50	4.43	4.16	4.17	-3.0
Prostatectomy	22.79	24.75	23.61	22.20	22.14	-0.7	10.21	9.08	9.29	8.69	7.50	-6.6
Condition												
Diabetic Ketoacidosis	0.38	0.36	0.34	0.30	0.29	-5.9	114.43	117.23	112.01	106.90	103.24	-2.4
Hypertension	1.22	1.09	0.98	0.90	0.83	-8.0	11.67	10.92	12.22	11.21	8.31	-7.2
Congestive Heart Failure	17.62	17.89	18.21	17.93	18.44	1.2	129.64	127.05	122.46	116.01	107.86	-4.2
Asthma	2.80	2.78	2.81	2.72	2.67	-1.2	19.80	21.00	20.89	21.41	21.85	2.6
Transient Ischemic Attack	5.12	4.83	4.57	4.14	3.98	-5.6	13.64	13.04	13.88	13.07	12.03	-3.0

1/ PTCA is percutaneous transluminal coronary angioplasty
CABG is coronary artery bypass graft

Percutaneous Transluminal Coronary Angioplasty

Race and Sex

Discharge Rates:

The discharge rate for PTCA varied substantially across the four race-sex groups. In 1990, the overall rate was 3.55 discharges per 1,000 beneficiaries. White men had significantly higher discharge rates for PTCA (5.41 discharges/1,000 beneficiaries) in 1990 than the other race-sex group (Table 2). White women had the next highest rate (2.59/1,000) followed by black men (1.81/1,000) and black women (1.26/1,000).

As noted previously, regression equations were fitted to the discharge rates for all beneficiaries as well as for each demographic and geographic group to test for a significant trend (slope) over the 5 year period. In addition, to test for differences in the rate of change, a comparison of the slopes was made for various combinations of groups. During the 5 years, the discharge rates for PTCA showed a significantly increasing trend in all race-sex groups (Table 2 and Figure 1). Of these four groups, the slope for white males (0.81) was significantly greater than the slopes for each of the other race-sex groups. This indicates that the differences in discharge rates between white men and the other three race-sex groups observed in the mid-1980s are increasing.

30-day Post-admission Mortality Rates:

In 1990, white men had the lowest 30-day post-admission mortality rate (20.33 deaths/1,000 discharges). This was not statistically lower than the 30-day post-admission mortality rate in black men, 23.28 (rate ratio of black men/white men = 1.15, 95 percent CI 0.82-1.66). However men of both races had lower 30-day post-admission mortality rates following PTCA than women (27.02 deaths/1,000 discharges for white women and 30.24 deaths/1,000 discharges for black women) (Table 2 and Figure 2).

Concurrent with the positive slopes for the rates for PTCA, there was a significantly decreasing trend in the 30-day post-admission mortality rates for white men and white women (Table 2 and Figure 2). The slopes for black men and women were also negative, but they were not statistically different from zero.

Age

Discharge Rates:

Persons 65-74 years old had significantly higher discharge rates for PTCA in 1990 (4.35 discharges/1,000 beneficiaries), than either the 75-84 year olds (3.02/1,000), or persons 85 and above (0.68/1,000) (Table 2). The rates of PTCA showed a significantly increasing trend in all three age groups over the 5 year period. The slope for persons 65-74 years of age was significantly greater than that for persons 85 years of age and older, but it was not significantly greater than that for persons 75-84 years of age (Figure 3).

30-Day Post-admission Mortality Rates:

In 1990, as shown in Table 2 and Figure 4, the two older age groups had significantly higher rates of 30-day post-admission deaths per 1,000 discharges, 36.20/1,000 and 74.89/1,000 respectively, than persons 65-74 years of age, 18.87/1,000. It is interesting that the rate of reduction in the 30-day post-admission mortality rate was greatest in the two oldest age groups which are the groups that began the 5 year observation period with the highest 30-day post-admission mortality rates.

Geographic Area

Discharge Rates:

The discharge rate for PTCA in 1990 for MSA residents (3.52 discharges/1,000 persons) was similar to the rate for persons living in non-MSA residents (3.50/1,000). During the 5 year period, for both the MSA and non-MSA residents the trends describing the discharge rates increased significantly and the slopes were similar (Figure 5).

30-Day Post-Admission Mortality Rates:

In 1990, the 30-day post-admission mortality rate among the MSA residents (23.93 deaths/1,000 discharges) was significantly lower than among the non-MSA residents (27.31/1,000). However, such a difference was not observed earlier in the study period (Figure 6). Also, over the 5 year period the decreasing trend in the 30-day post-admission mortality rate for the two geographic area groups was not statistically different. Thus, this 14.1 percent difference in 1990 mortality rates needs to be monitored in the future.

Table 2. Percutaneous transluminal coronary angioplasty: Number of discharges per 1,000 beneficiaries, number of 30-day post-admission deaths per 1,000 discharges, and selected statistical tests of the rates and trends, by demographic and geographic groups, for Medicare beneficiaries 65 years of age and older, U.S., 1986-90.

	Discharge Rates					30-day Post-admission Mortality Rates				
				Tests of Slopes					Tests of Slopes	
Demographic or Geographic Group	1990 1/ Rate	Rate 2/ Ratio	95% CI	5 yr 3/ Slope	Difference 4/ in Slopes	1990 1/ Rate	Rate 2/ Ratio	95% CI	5 yr 3/ Slope	Difference 4/ in Slopes
All Beneficiaries	3.55	--	--	0.55 **	--	23.19	--	--	-3.37 *	--
Race and Sex										
White Male	5.41	reference		0.81 **	reference	20.33	reference		-3.49 **	reference
White Female	2.59	0.48	(0.47,0.48)	0.41 **	**	27.02	1.33	(1.22,1.45)	-3.50 **	NS
Black Male	1.81	0.33	(0.32,0.35)	0.32 **	*	23.28	1.15	(0.82,1.66)	-4.11	NS
Black Female	1.26	0.23	(0.22,0.24)	0.23 **	**	30.24	1.49	(1.12,1.98)	-1.22	NS
Age										
65-74	4.35	reference		0.63 **	reference	18.87	reference		-2.84 **	reference
75-84	3.02	0.70	(0.69,0.71)	0.53 **	NS	36.20	1.92	(1.77,2.08)	-5.54 **	**
85+	0.68	0.16	(0.15,0.16)	0.15 *	**	74.89	3.97	(3.37,4.67)	-9.40 *	*
Geographic Area										
MSA	3.52	reference		0.54 **	reference	23.93	reference		-3.33 **	reference
Non-MSA	3.50	0.99	(0.98,1.01)	0.54 **	NS	27.31	1.14	(1.05,1.24)	-2.37 *	NS

1/ Rates for race and sex groups and all beneficiaries are age-adjusted using 1986 as a standard.

2/ The rate ratio is the reference group rate divided by the sub-group rate.

3/ The null hypothesis is that the slope equals zero.

4/ The null hypothesis is that the slope of each sub-group is not different from the reference sub-group.

* $p < 0.05$

** $p < 0.01$

Figure 1. Percutaneous Transluminal Coronary Angioplasty
Discharge Rates for Medicare Beneficiaries
65 Years of Age and Older, by Race and Sex, U.S., 1986-90

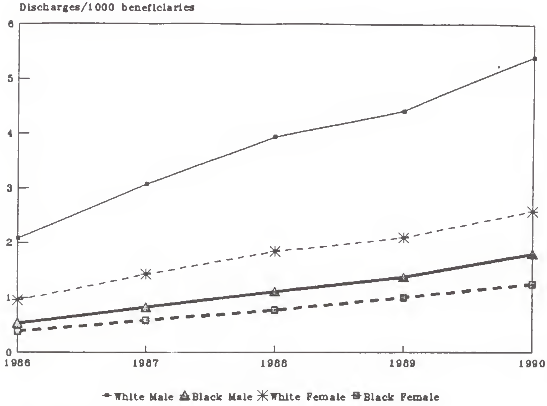


Figure 2. Percutaneous Transluminal Coronary Angioplasty
30-Day Post-Admission Mortality Rates for Medicare Beneficiaries
65 Years of Age and Older, by Race and Sex, U.S., 1986-90

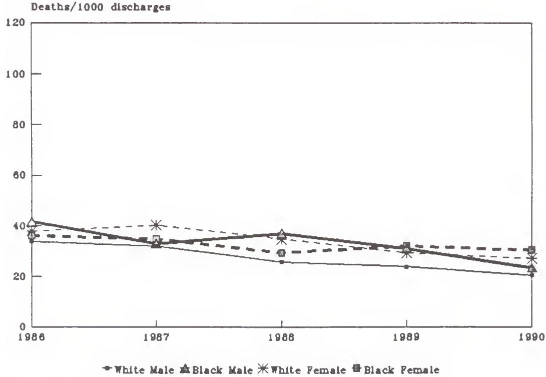


Figure 3. Percutaneous Transluminal Coronary Angioplasty
Discharge Rates for Medicare Beneficiaries
65 Years of Age and Older, by Age, U.S., 1986-90

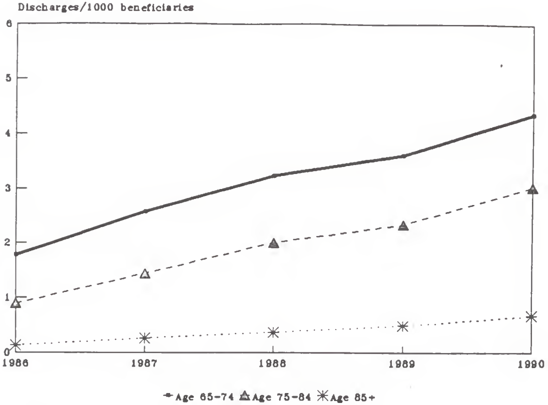


Figure 4. Percutaneous Transluminal Coronary Angioplasty
30-Day Post-Admission Mortality Rates for Medicare Beneficiaries
65 Years of Age and Older, by Age, U.S., 1986-90

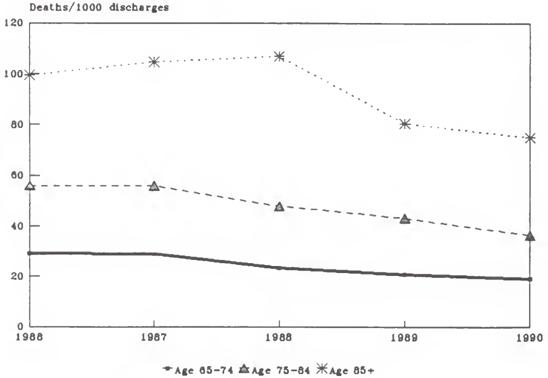


Figure 5. Percutaneous Transluminal Coronary Angioplasty
Discharge Rates for Medicare Beneficiaries
65 Years of Age and Older, by Geographic Area, U.S., 1986-90

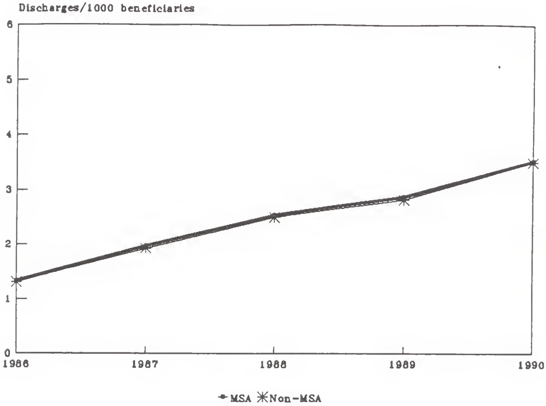
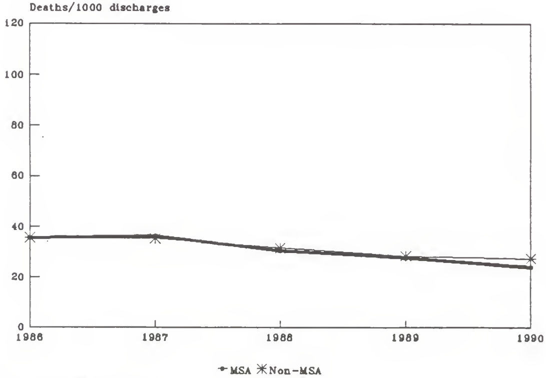


Figure 6. Percutaneous Transluminal Coronary Angioplasty
30 Day Post-Admission Mortality Rates for Medicare Beneficiaries
65 Years of Age and Older, by Geographic Area, U.S., 1986-90



Coronary Artery By-pass Graft (CABG)

Race and Sex

Discharge Rates:

The discharge rate for CABG varied substantially across the four race-sex groups. In 1990, the overall rate was 3.46 discharges per 1,000 beneficiaries. White men had significantly higher discharge rates for CABG (6.09 discharges/1,000 beneficiaries) in 1990 than the other race-sex group (Table 2). White women had the next highest rate (1.98/1,000) followed by black men (1.68/1,000) and black women (1.10/1,000).

During the 5 year period, the only race-sex group that showed a significantly increasing trend in the discharge rate was white males, 0.26 (Table 2 and Figure 1).

30-day Post-admission Mortality Rates:

In 1990, white men had the lowest 30-day post-admission mortality rate (26.20 deaths/1,000 discharges). This was not statistically lower than the 30-day post-admission mortality rate in black men, 33.59/1,000 (rate ratio of black men/white men = 1.28, 95 percent CI 0.96-1.71). In addition, white men and black men had lower 30-day post admission mortality rates following CABG than women of the same race (37.69/1,000 for white women and 42.44/1,000 for black women (Table 2).

The slopes of the lines describing the 30-day post-admission mortality rates were decreasing at a significant level for each of the race-sex groups, except for black male beneficiaries (Table 2 and Figure 2). Also, women, who began the 5 year period with the highest 30-day post-admission mortality rates, had the greatest decrease in these rates. For white women, the slope of the regression equation was significantly different from the slope for white men, indicating that the trends in the 30-day post-admission mortality rates were moving closer together for these two groups.

Age

Discharge Rates:

Persons 65-74 year old persons had higher discharge rates for CABG in 1990 (4.29 discharges/1,000 beneficiaries), than either the 75-84 year old (2.94/1,000), or 85 and above age group (0.37/1,000) (Table 2 and Figure 3). Only in the age group 75-84 years of age was the slope of the regression equation significantly greater than zero. The regression equation slope of the 65-74 year old age group was not significantly different than that of the other two age groups.

30-Day Post-admission Mortality Rates:

The two older age groups had significantly higher rates of 30-day post-admission deaths per 1,000 discharges, 43.96/1,000 and 104.80/1,000, respectively, than persons 65-74 years of age, 25.67/1,000 (Table 2 and Figure 4). It is interesting that the rate of reduction in the 30-day post-admission mortality rate was greatest in the two oldest age groups which are the groups that started the 5 year observation period with the highest 30-day post-admission mortality rates.

Geographic Area

Discharge Rates:

The discharge rate for CABG in 1990 in beneficiaries living in MSAs (3.42 discharges/1,000 beneficiaries) was similar to the rate in persons living in non-MSAs (3.40/1,000). The two regression equation slopes were not different from zero, and thus, not different from each other (Table 2 and Figure 5).

30-Day Post-Admission Mortality Rates:

In 1990, the 30-day post-admission mortality rate among the MSA residents (32.55 deaths/1,000 discharges) was significantly higher than among the non-MSA residents (29.52/1,000). However, unlike PTCA, the magnitude of the difference appears to be declining over the study period (Figure 6). Also, over the 5 years the reduction in the 30-day post-admission mortality rate for the two geographic area groups was not statistically different.

Discussion

PTCA and CABG are alternative treatments for coronary artery disease. For PTCA, major increases in the rates of the procedure were noted in almost all of the demographic and geographic groups during the 5 year period. This was probably caused by the diffusion of this relatively new technology. In contrast, CABG, which has been part of the surgical treatment of coronary artery disease for a longer time, experienced more stable rates. Slopes of the regression equations were significantly greater than zero for only two groups: white men and persons 75-84 years of age. However, as with PTCA, the slopes of the regression equations for 30-day post-admission mortality rates regression equations were all less than zero, and the majority were significantly different from zero. This indicates a continuing improvement in outcome following CABG.

Table 2. Coronary artery bypass graft: Number of discharges per 1,000 beneficiaries, number of 30-day post-admission deaths per 1,000 discharges, and selected statistical tests of the rates and trends, by demographic and geographic groups, for Medicare beneficiaries 65 years of age and older, U.S., 1986-90.

	Discharge Rates					30-day Post-admission Mortality Rates				
				Tests of Slopes					Tests of Slopes	
Demographic or Geographic Group	1990 Rate 1/	Rate Ratio 2/	95% CI	5 yr Slope 3/	Difference in Slopes 4/	1990 Rate 1/	Rate Ratio 2/	95% CI	5 yr Slope 3/	Difference in Slopes 4/
All Beneficiaries	3.46	--	--	0.17	--	30.13	--	--	-7.28 *	--
Race and Sex										
White Male	6.09	reference		0.26 **	reference	26.20	reference		-6.16 **	reference
White Female	1.98	0.32	(0.32,0.33)	0.10	NS	37.69	1.44	(1.33,1.55)	-9.93 **	**
Black Male	1.68	0.28	(0.26,0.29)	0.18	NS	33.59	1.28	(0.96,1.71)	-6.01	NS
Black Female	1.10	0.18	(0.17,0.19)	0.12	NS	42.44	1.62	(1.26,2.09)	-12.62 *	NS
Age										
65-74	4.29	reference		0.13	reference	25.67	reference		-6.66 **	reference
75-84	2.94	0.68	(0.67,0.69)	0.25 *	NS	43.96	1.71	(1.59,1.84)	-10.01 **	**
85+	0.37	0.09	(0.08,0.09)	0.08	NS	104.80	4.08	(3.41,4.89)	-9.12	NS
Geographic Area										
MSA	3.42	reference		0.15	reference	32.55	reference		-7.37 **	reference
Non-MSA	3.40	0.99	(0.98,1.01)	0.16	NS	29.52	0.91	(0.84,0.98)	-6.29 *	NS

1/ Rates for race and sex groups and all beneficiaries are age-adjusted using 1986 as a standard.

2/ The rate ratio is the reference group rate divided by the sub-group rate.

3/ The null hypothesis is that the slope equals zero.

4/ The null hypothesis is that the slope of each sub-group is not different from the reference sub-group.

* $p < 0.05$

** $p < 0.01$

Figure 1. Coronary Artery Bypass Graft Discharge Rates for Medicare Beneficiaries 65 Years of Age and Older, by Race and Sex, U.S., 1986–90

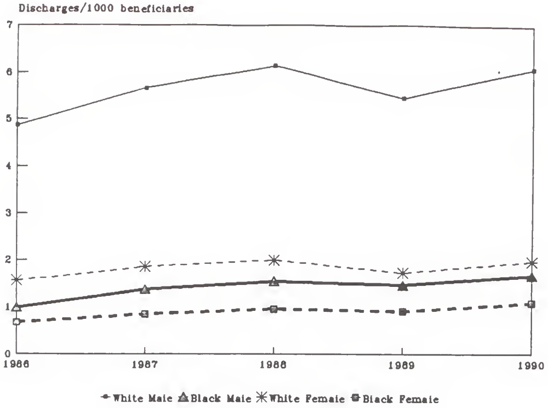


Figure 2. Coronary Artery Bypass Graft 30-Day Post-Admission Mortality Rates for Medicare Beneficiaries 65 Years of Age and Older, by Race and Sex, U.S., 1986–90

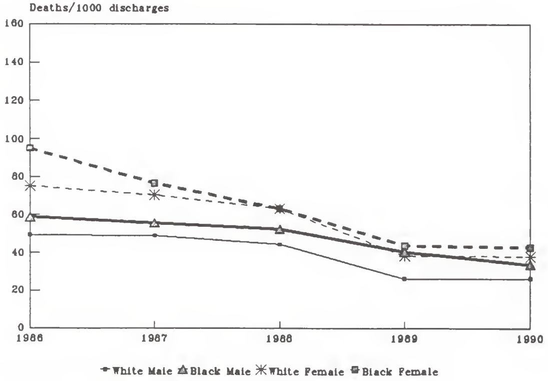


Figure 3. Coronary Artery Bypass Graft Discharge Rates for Medicare Beneficiaries 65 Years of Age and Older, by Age, U.S., 1986-90

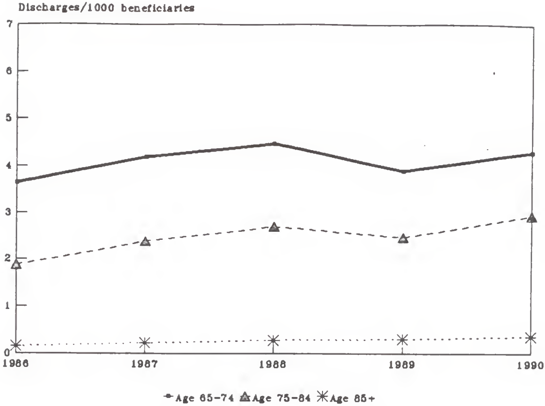


Figure 4. Coronary Artery Bypass Graft 30-Day Post-Admission Mortality Rates for Medicare Beneficiaries 65 Years of Age and Older, by Age, U.S., 1986-90

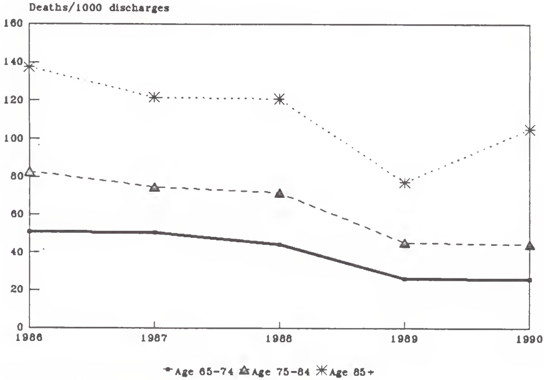


Figure 5. Coronary Artery Bypass Graft
Discharge Rates for Medicare Beneficiaries
65 Years of Age and Older, by Geographic Area, U.S., 1986-90

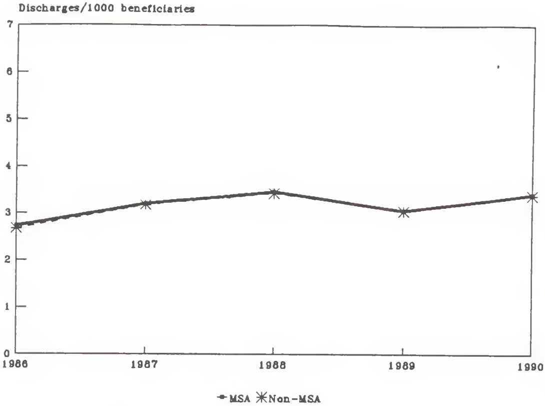
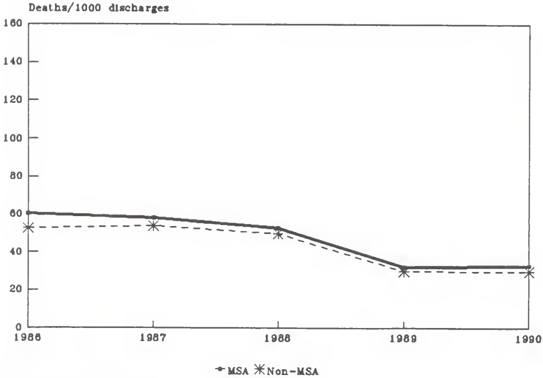


Figure 6. Coronary Artery Bypass Graft
30-Day Post-Admission Mortality Rates for Medicare Beneficiaries
65 Years of Age and Older, by Geographic Area, U.S., 1986-90



Total Knee Replacement (TKR)

Race and Sex

Discharge Rates:

In 1990, the overall rate for TKR was 3.14 discharges per 1,000 beneficiaries. White women had significantly higher discharge rates for TKR (3.54/1,000) in 1990 than the other race-sex group (Table 2). White men had the next highest rate (2.77/1,000) followed by black women (2.72/1,000) and black men (0.94/1,000).

During the 5 year period, the trend in the discharge rates for TKR increased significantly in all four race-sex groups (Table 2 and Figure 1). The slope observed for the reference group, white males, was not statistically different from the slopes of the other three race-sex groups.

30-day Post-Admission Mortality Rates:

The 30-day post admission mortality rates for TKR were much lower than those for either PTCA or CABG. In 1990, black women and white men had the highest rates of 30-day post-admission deaths per 1,000 (7.49/1,000 and 7.11/1,000, respectively). The rate for white men was not statistically higher than the 30-day post-admission mortality rate in black men, 6.28/1,000, but it was significantly greater than the 30-day post-admission mortality rate for white women (3.80/1,000). Even with the positive slopes for the discharge rates for TKR, there was no significant difference in the trend of 30-day post-admission mortality rates from zero for any race-sex group (Table 2 and Figure 2).

Age

Discharge Rates:

In 1990, persons 65-74 years of age and persons 75-84 years of age had higher rates of discharges for TKR per 1,000 beneficiaries (3.15/1,000 and 3.69/1,000, respectively) than persons 85 and above (1.34/1,000) (Table 2 and Figure 3). The trend in the rates of TKR showed a significantly increase in all three age groups over the 5 year period. The slopes for persons 65-74 years of age and 75-84 years of age were similar (0.29 and 0.30, respectively) and the slope for persons 65-74 years of age was significantly greater than that for persons 85 years of age and older.

30-Day Post-admission Mortality Rates:

In 1990, as shown in Table 2 and Figure 4, the two older age groups had significantly higher rates of 30-day post-admission deaths per 1,000 discharges, 6.28/1,000 and 13.91/1,000, respectively, than persons 65-74 years of age (3.58/1,000).

Geographic Area

Discharge Rates:

The discharge rate per 1,000 beneficiaries for TKR in 1990 for persons living in non-MSAs (3.62/1,000) was significantly higher (24 percent) from the rate for persons living in MSAs (2.91/1,000). The rate of increase was significantly higher for non-MSA residents (Table 2 and Figure 5).

30-Day Post-Admission Mortality Rates:

In 1990, the rate of 30-day post-admission deaths per 1,000 discharges among the MSA residents (5.03/1,000) was not significantly different from the non-MSA residents (5.10/1,000); the similarity of the 30-day post-admission mortality rates has been consistent over the 5 year period (Figure 6).

Table 2. Total knee replacement: Number of discharges per 1,000 beneficiaries, number of 30-day post-admission deaths per 1,000 discharges, and selected statistical tests of the rates and trends, by demographic and geographic groups, for Medicare beneficiaries 65 years of age and older, U.S., 1986-90.

	Discharge Rates					30-day Post-admission Mortality Rates				
				Tests of Slopes					Tests of Slopes	
Demographic or Geographic Group	1990 1/ Rate	Rate 2/ Ratio	95% CI	5 yr 3/ Slope	Difference 4/ in Slopes	1990 1/ Rate	Rate 2/ Ratio	95% CI	5 yr 3/ Slope	Difference 4/ in Slopes
All Beneficiaries	3.14	--	--	0.27 **	--	5.07	--	--	-0.03	--
Race and Sex										
White Male	2.77	reference		0.27 **	reference	7.11	reference		-0.14	reference
White Female	3.54	1.28	(1.26,1.30)	0.29 **	NS	3.80	0.53	(0.44,0.65)	-0.04	NS
Black Male	0.94	0.34	(0.32,0.36)	0.11 **	NS	6.28	0.88	(0.36,2.17)	-1.26	NS
Black Female	2.72	0.98	(0.95,1.02)	0.28 **	NS	7.49	1.05	(0.70,1.58)	0.30	NS
Age										
65-74	3.15	reference		0.29 **	reference	3.58	reference		-0.03	reference
75-84	3.69	1.17	(1.15,1.19)	0.30 **	NS	6.28	1.75	(1.43,2.15)	-0.11	NS
85+	1.34	0.43	(0.41,0.44)	0.12 **	**	13.91	3.88	(2.87,5.25)	0.27	NS
Geographic Area										
MSA	2.91	reference		0.26 **	reference	5.03	reference		-0.06	reference
Non-MSA	3.62	1.24	(1.23,1.26)	0.31 **	*	5.10	1.01	(0.83,1.24)	-0.04	NS

1/ Rates for race and sex groups and all beneficiaries are age-adjusted using 1986 as a standard.

2/ The rate ratio is the reference group rate divided by the sub-group rate.

3/ The null hypothesis is that the slope equals zero.

4/ The null hypothesis is that the slope of each sub-group is not different from the reference sub-group.

* $p < 0.05$

** $p < 0.01$

Figure 1. Total Knee Replacement
Discharge Rates for Medicare Beneficiaries
65 Years of Age and Older, by Race and Sex, U.S., 1986-90

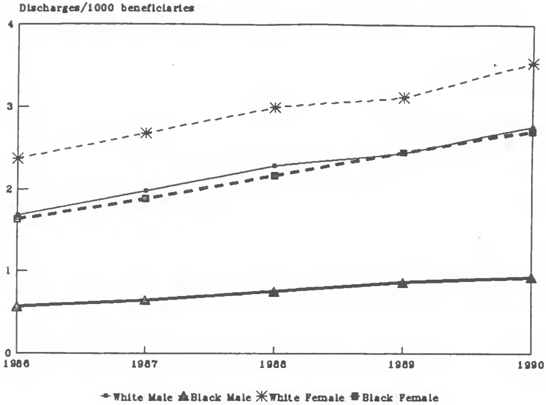


Figure 2. Total Knee Replacement
30-Day Post-Admission Mortality Rates for Medicare Beneficiaries
65 Years of Age and Older, by Race and Sex, U.S., 1986-90

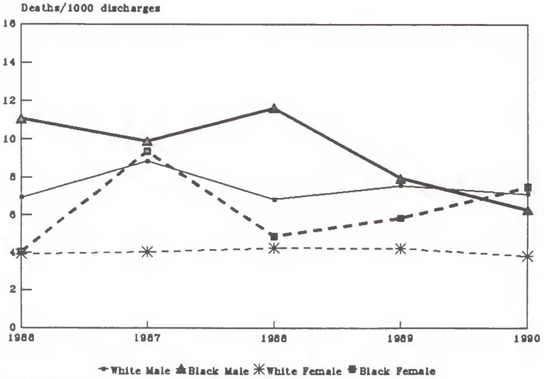


Figure 3. Total Knee Replacement Discharge Rates for Medicare Beneficiaries 65 Years of Age and Older, by Age, U.S., 1986–90

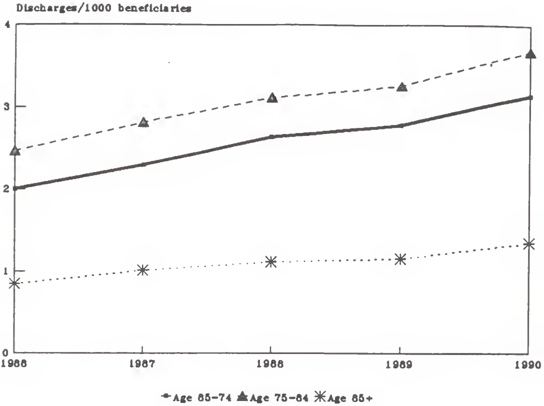


Figure 4. Total Knee Replacement 30-Day Post-Admission Mortality Rates for Medicare Beneficiaries 65 Years of Age and Older, by Age, U.S., 1986–90

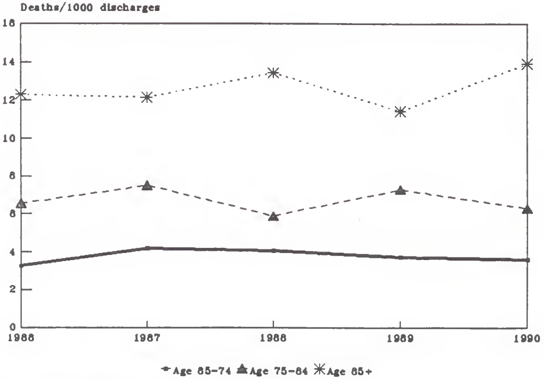


Figure 5. Total Knee Replacement Discharge Rates for Medicare Beneficiaries 65 Years of Age and Older, by Geographic Area, U.S., 1986–90

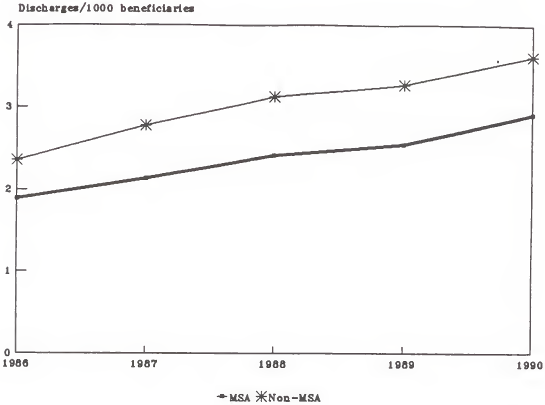
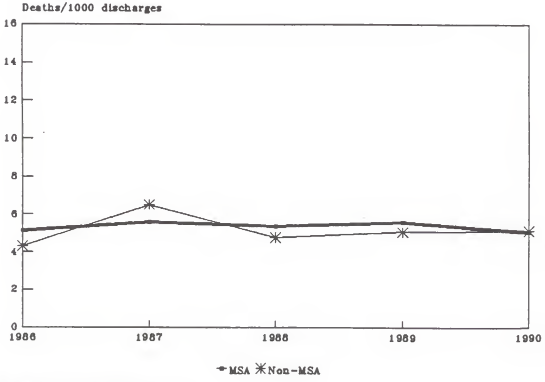


Figure 6. Total Knee Replacement 30–Day Post–Admission Mortality Rates for Medicare Beneficiaries 65 Years of Age and Older, by Geographic Area, U.S., 1986–90



Mastectomy

Race

Discharge Rates:

In 1990, the overall rate for mastectomy in women was 3.51 discharges per 1,000 female beneficiaries. In 1990, white women had a significantly higher discharge rate for mastectomy (3.58/1,000) than black women (2.67/1,000) (rate ratio of white women/black women = 0.75, 95 percent CI 0.72-0.77) (Table 2).

During the 5 year period, the trend in the discharge rates for mastectomy did not show a significant change for either race group, and the slopes of the trend lines were not significantly different, indicating that the differences in discharge rates between white women and black women observed in the 5 year period are remaining the same (Table 2 and Figure 1).

30-day Post-Admission Mortality Rates:

In 1990, white women had significantly lower rates of 30-day post-admission deaths per 1,000 discharges (3.94/1,000) than black women (7.45/1,000) (rate ratio of black women/white women = 1.89, 95 percent CI 1.26-2.85). The slopes of the lines describing the 5 year trends in the 30-day post-admission mortality rates were neither increasing or decreasing significantly, nor were they different from each other (Figure 2).

Age

Discharge Rates:

In 1990, women 75-84 years of age had significantly higher discharge rates for mastectomy than women 65-74 years of age, although the difference was small, 4 percent. The rate for the youngest age group was significantly higher than the discharge rates for women 85 years of age and above (Table 2). Over the 5 years, the trend in the rates of mastectomy did not show any significant change in any of the three age groups (Figure 3).

30-Day Post-Admission Mortality Rates:

In 1990, the two older age groups had significantly higher rates of 30-day post-admission deaths per 1,000 discharges, 5.12/1,000 and 11.14/1,000, respectively, than women 65-74 years of age (2.46/1,000). The rate of reduction in the 30-day post-admission mortality rate as measured by the 5 year slopes was significant only for the oldest age group

(Table 2 and Figure 4). There was no difference between the slopes of the fitted regression equations for the three age groups.

Geographic Area

Discharge Rates:

The discharge rate for mastectomy in 1990 for women living in MSAs (3.56 discharges/1,000 beneficiaries) was significantly higher than the rate for women living in non-MSAs (3.44/1,000) (rate ratio = 0.97, 95 percent CI = 0.95-0.99) (Table 2 and Figure 5). The slopes describing the trend lines showed no change nor were they different from each other.

30-Day Post-Admission Mortality Rates:

In 1990, the 30-day post-admission mortality rate among the MSA residents (4.33/1,000 discharges) was not different from the rate among the non-MSA residents (3.80/1,000 discharges) (rate ratio = 0.88, 95 percent CI = 0.65-1.18). Over the 5 year period the slopes describing the trend lines for the post-admission mortality rate for the two geographic area groups showed no change nor were they different from each other (Table 2 and Figure 6).

Table 2. Mastectomy in women: Number of discharges per 1,000 beneficiaries, number of 30-day post-admission deaths per 1,000 discharges, and selected statistical tests of the rates and trends, by demographic and geographic groups, for Medicare beneficiaries 65 years of age and older, U.S., 1986-90.

	Discharge Rates					30-day Post-admission Mortality Rates				
				Tests of Slopes					Tests of Slopes	
Demographic or Geographic Group	1990 Rate 1/	Rate Ratio 2/	95% CI	5 yr Slope 3/	Difference in Slopes 4/	1990 Rate 1/	Rate Ratio 2/	95% CI	5 yr Slope 3/	Difference in Slopes 4
All Beneficiaries	3.51	--	--	0.02	--	4.15	--	--	-0.14 *	--
Race and Sex										
White Female	3.58	reference		0.01	reference	3.94	reference		-0.19	reference
Black Female	2.67	0.75	(0.72,0.77)	0.04	NS	7.45	1.89	(1.26,2.85)	0.66	NS
Age										
65-74	3.60	reference		0.00	reference	2.46	reference		-0.05	reference
75-84	3.75	1.04	(1.02,1.06)	0.04	NS	5.12	2.08	(1.55,2.80)	-0.10	NS
85+	2.47	0.69	(0.67,0.71)	0.01	NS	11.14	4.53	(3.23,6.36)	-0.89 *	NS
Geographic Area										
MSA	3.56	reference		0.00	reference	4.33	reference		0.19	reference
Non-MSA	3.44	0.97	(0.95,0.99)	0.02	NS	3.80	0.88	(0.65,1.18)	0.00	NS

1/ Rates for race and sex groups and all beneficiaries are age-adjusted using 1986 as a standard.
2/ The rate ratio is the reference group rate divided by the sub-group rate.
3/ The null hypothesis is that the slope equals zero.
4/ The null hypothesis is that the slope of each sub-group is not different from the reference sub-group.

* $p < 0.05$
** $p < 0.01$

Figure 1. Mastectomy
Discharge Rates for Medicare Beneficiaries
65 Years of Age and Older, by Race, U.S., 1986-90

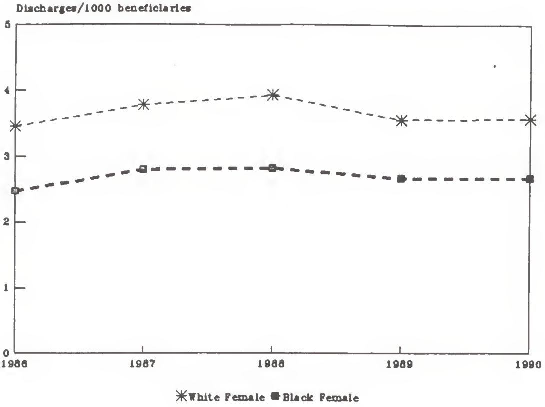


Figure 2. Mastectomy
30-Day Post-Admission Mortality Rates for Medicare Beneficiaries
65 Years of Age and Older, by Race, U.S., 1986-90

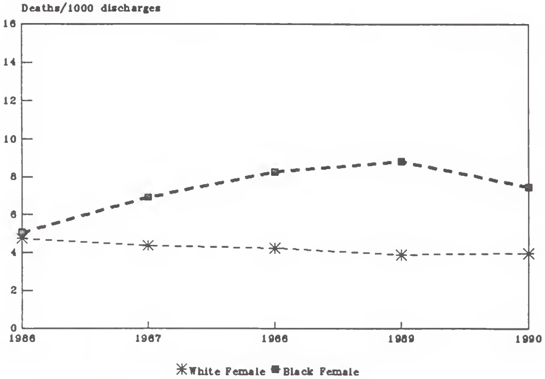


Figure 3. Mastectomy
Discharge Rates for Medicare Beneficiaries
65 Years of Age and Older, by Age, U.S., 1986-90

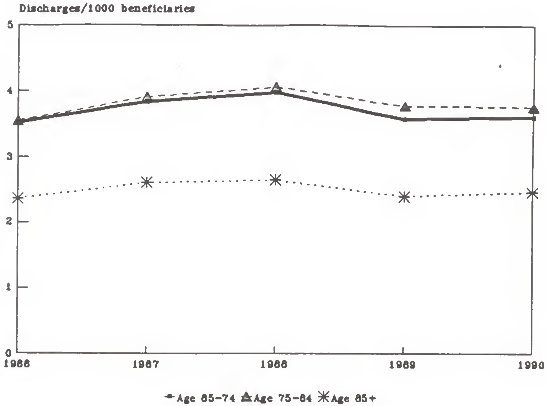


Figure 4. Mastectomy
30-Day Post-Admission Mortality Rates for Medicare Beneficiaries
65 Years of Age and Older, by Age, U.S., 1986-90

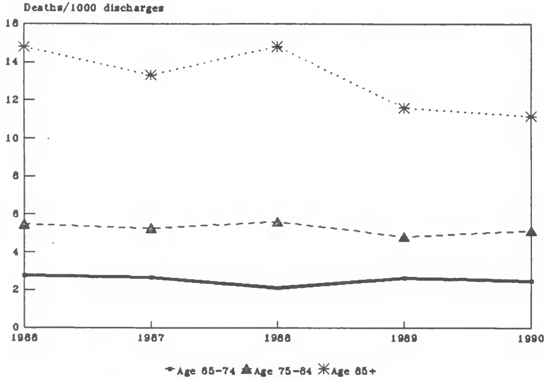


Figure 5. Mastectomy
Discharge Rates for Medicare Beneficiaries
65 Years of Age and Older, by Geographic Area, U.S., 1986-90

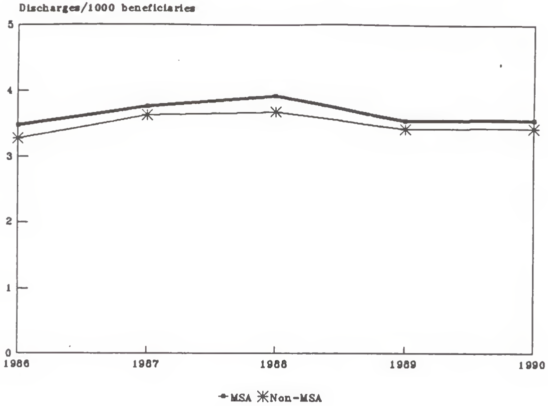
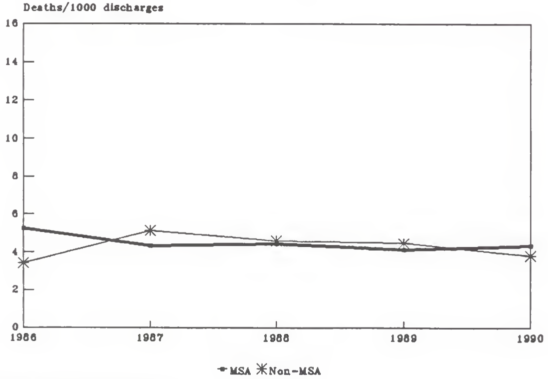


Figure 6. Mastectomy
30-Day Post-Admission Mortality Rates for Medicare Beneficiaries
65 Years of Age and Older, by Geographic Area, U.S., 1986-90



Prostatectomy

Race

Discharge Rates:

In 1990, the overall discharge rate for prostatectomy was 22.17 discharges per 1,000 male beneficiaries. White men had approximately a 10 percent higher discharge rate for prostatectomy (22.32/1,000) in 1990 than black men (20.33/1,000) (rate ratio = 0.91, 95 percent CI = 0.90,0.93) (Table 2).

During the 5 year period, the discharge rates for prostatectomy showed no significant change in the trend line for either race group, nor were the slopes of these lines different one from the other (Table 2 and Figure 1).

30-day Post-Admission Mortality Rates:

In 1990, white men had significantly lower rates of 30-day post-admission deaths per 1,000 prostatectomy discharges (7.53/1,000) than black men (9.48/1,000) (rate ratio = 1.26, 95 percent CI = 1.07-1.48) (Table 2). The slope of the 5 year 30-day post-admission mortality rates for white men decreased significantly, although the slope did not decrease significantly for black men. The slopes of the lines for each race were not different from each other (Figure 2).

Age

Discharge Rates:

Men 65-74 years of age had significantly lower discharge rates for prostatectomy in 1990 (18.78 discharges/1,000 men), than either the 75-84 year olds (28.45/1,000), or persons 85 and above (26.82/1,000) (Table 2 and Figure 3). The discharge rates in the two older age groups were about 1.5 times that of the younger men. The trends in the rates of prostatectomy were not significant for any of the three age groups. The rate of decline for men age 75-84 was significantly different than for the reference group, men age 65-74.

30-Day Post-Admission Mortality Rates:

In 1990, the two older age groups had significantly higher rates of 30-day post-admission deaths per 1,000 discharges, 9.45/1,000 and 21.81/1,000, respectively, than persons 65-74 years of age (3.77/1,000). The rates of reduction were significant for all age groups. It is interesting to note that as for PTCA, CABG and total knee replacement the decrease in the 30-day post-admission mortality rate was greatest in the age groups that began the 5 year observation period with the highest 30-day post-admission mortality rates (Table 2 and Figure 4).

Geographic Area

Discharge Rates:

The discharge rate for prostatectomy in 1990 for men living in MSAs (22.01 discharges/1,000 male beneficiaries) was lower than the rate for men living in non-MSAs (22.51/1,000) (rate ratio = 1.02, 95 percent CI = 1.01,1.03) (Table 2 and Figure 5). The trend in the rates did not change significantly for either of the geographic groups.

30-Day Post-Admission Mortality Rates:

In 1990, the 30-day post-admission mortality rate among the MSA residents (7.57 deaths/1,000 discharges) was similar to the rate among the non-MSA residents (7.36/1,000). Over the 5 year period the trends in the 30-day post-admission mortality rates for the two geographic area groups were significantly lower than zero, and they were not statistically different from each other (Figure 6).

Discussion

Prostatectomy is a procedure that has received attention in the health services research literature. It has been used as a major example of the uncertainly of medical decisionmaking; geographic variations in prostatectomy rates have been well documented. In the baseline data shown here, the slopes describing the 1986-1990 hospital discharge rates for prostatectomy showed no change for all men, or for the two race groups, or the three age groups or the two geographic categories. As with other procedures, higher rates of surgery and lower 30-day post-admission mortality rates in 1990 were found among one group, in this case white men.

Prostatectomy is a procedure used to treat different types of symptoms and underlying pathology. The symptoms and treatment for a man with benign prostatic hypertrophy may be very different than that for a man with cancer of the prostate. It may also be very useful to monitor the rates of prostatectomy for benign prostatic hypertrophy, for cancer of the prostate, and for other reasons separately.

Table 2. Prostatectomy: Number of discharges per 1,000 beneficiaries, number of 30-day post-admission deaths per 1,000 discharges, and selected statistical tests of the rates and trends, by demographic and geographic groups, for Medicare beneficiaries 65 years of age and older, U.S., 1986-90.

	Discharge Rates					30-day Post-admission Mortality Rates				
				Tests of Slopes					Tests of Slopes	
Demographic or Geographic Group	1990 1/ Rate	Rate 2/ Ratio	95% CI	5 yr 3/ Slope	Difference 4/ in Slopes	1990 1/ Rate	Rate 2/ Ratio	95% CI	5 yr 3/ Slope	Difference 4/ in Slopes
All Beneficiaries	22.17	--	--	-0.34	--	7.67	--	--	-0.60	--
Race and Sex										
White Male	22.32	reference		-0.33	reference	7.53	reference		-0.59 **	reference
Black Male	20.33	0.91	(0.90,0.93)	-0.44	NS	9.48	1.26	(1.07,1.48)	-0.65	NS
Age										
65-74	18.78	reference		-0.09	reference	3.77	reference		-0.36 *	reference
75-84	28.45	1.52	(1.50,1.53)	-0.75	*	9.45	2.50	(2.24,2.80)	-0.65 **	NS
85+	26.82	1.43	(1.41,1.45)	-0.89	NS	21.81	5.78	(5.09,6.56)	-1.74 **	**
Geographic Area										
MSA	22.01	reference		-0.34	reference	7.57	reference		-0.59 **	reference
Non-MSA	22.51	1.02	(1.01,1.03)	-0.28	NS	7.36	0.97	(0.88,1.08)	-0.70 *	NS

1/ Rates for race and sex groups and all beneficiaries are age-adjusted using 1986 as a standard.
2/ The rate ratio is the reference group rate divided by the sub-group rate.
3/ The null hypothesis is that the slope equals zero.
4/ The null hypothesis is that the slope of each sub-group is not different from the reference sub-group.

* $p < 0.05$
** $p < 0.01$

Figure 1. Prostatectomy
Discharge Rates for Medicare Beneficiaries 65 Years of Age and Older, by Race, U.S., 1986-90

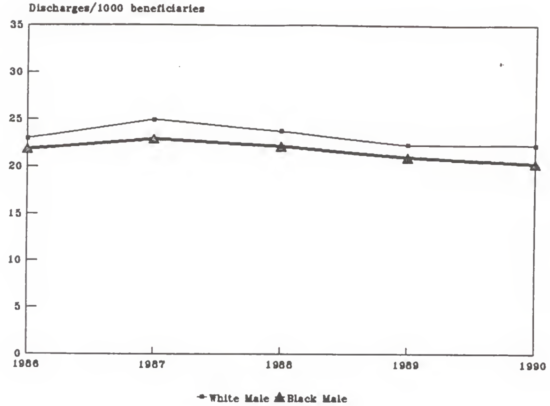


Figure 2. Prostatectomy
30-Day Post-Admission Mortality Rates for Medicare Beneficiaries 65 Years of Age and Older, by Race, U.S., 1986-90

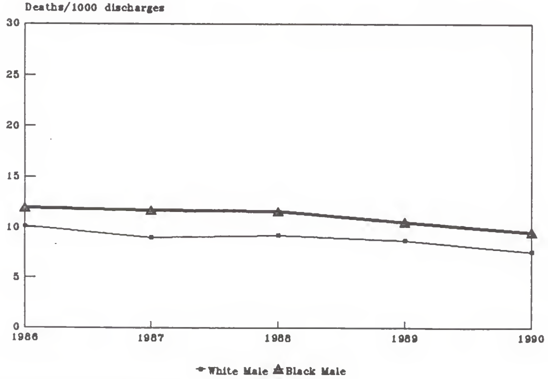


Figure 3. Prostatectomy
Discharge Rates for Medicare Beneficiaries 65 Years of Age and Older, by Age, U.S., 1986-90

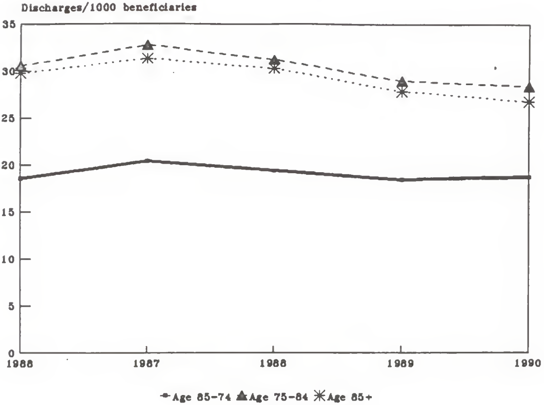


Figure 4. Prostatectomy
30-Day Post-Admission Mortality Rates for Medicare Beneficiaries 65 Years of Age and Older, by Age, U.S., 1986-90

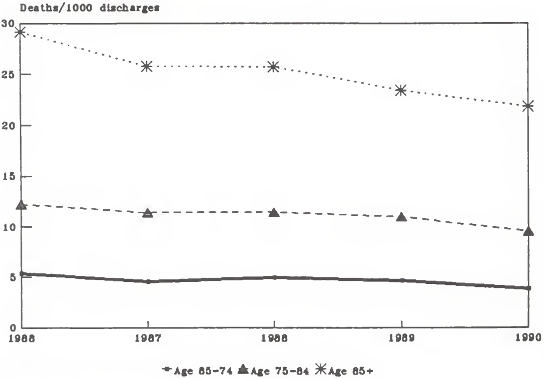


Figure 5. Prostatectomy
Discharge Rates for Medicare Beneficiaries
65 Years of Age and Older, by Geographic Area, U.S., 1986-90

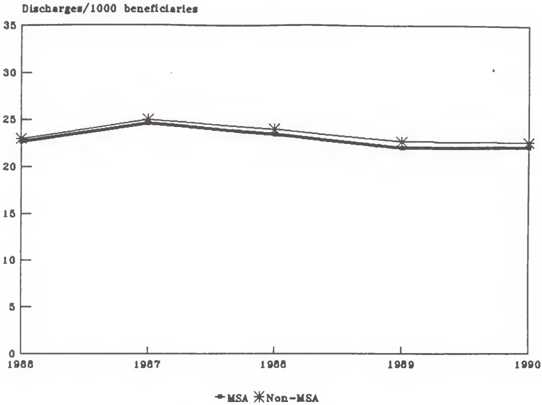
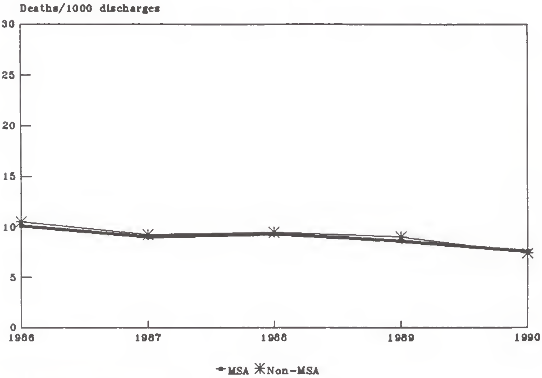


Figure 6. Prostatectomy
30-Day Post-Admission Mortality Rates for Medicare
65 Years of Age and Older, by Geographic Area, U.S., 1986-90



Diabetic Ketoacidosis (DKA)

Race and Sex

Discharge Rates:

The number of persons hospitalized because of DKA in 1990 was small (8,165) compared with the number of persons who underwent one of the procedures described previously or compared with the other medical conditions presented. DKA was included in this report because it is generally believed that hospitalization for DKA is one of several sentinel events that can be used to monitor access and quality of care.

The discharge rate for DKA varied substantially across the four race-sex groups in 1990. The overall rate was 0.29 discharges per 1,000 beneficiaries. In 1990, white men had significantly lower discharge rates for DKA (0.20/1,000) than white women (0.29/1,000), black men (0.77/1,000) or black women (0.82/1,000) (Table 2). While the rate ratios comparing the discharge rates for white men with black men and black women were 3.88 and 4.10, respectively it must be noted that the prevalence of diabetes is greater in black beneficiaries than in white beneficiaries. To measure that difference, comparison was made between whites and blacks of the rate ratio of admissions per 1,000 persons with diabetes as one of the five discharge diagnoses. In 1990, the rate ratio was 72.62/42.31, or about 1.72 (data not shown).

During the 5 year period, the trend of the discharge rates for DKA showed a significant decrease in all four race-sex groups except black men (Table 2 and Figure 1). Among the four slopes, the decrease observed for black females was significantly greater than the slopes for the reference group, white males.

30-day Post-Admission Mortality Rates:

In 1990, white men, the group that had the lowest discharge rate, had the highest 30-day post-admission mortality rate (120.20 deaths/1,000 discharges). This was significantly higher (between 17.8 and 34.4 percent) than the 30-day post-admission mortality rates in the other three race-sex groups. The decline in the slope for 30-day post-admission mortality rates was significantly different from zero only for black males. None of the slopes were significantly different from the slope of the reference group, white males (Figure 2).

Age

Discharge Rates:

The discharge rate for DKA for persons 65-74 years of age (0.28 discharges/1,000 beneficiaries) was significantly less than that for persons 75-84 year of age (0.33/1,000) (rate ratio = 1.18, 95 percent CI = 1.12-1.23), and similar to that for persons 85 and above (0.28/1,000) (Table 2). The trend of rates of DKA showed a significant decrease in all three age groups over the 5 year period, and the slopes were similar for all groups (Figure 3).

30-Day Post-Admission Mortality Rates:

In 1990, the two older age groups had significantly higher rates of 30-day post-admission deaths per 1,000 discharges, 121.40/1,000 and 213.30/1,000, than persons 65-74 years of age (71.03/1,000). None of the trends in 30-day post admission mortality rates was different from zero, nor were they different the reference group.

Geographic Area

Discharge Rates:

The discharge rate for DKA in 1990 for MSA residents (0.30 discharges/1,000 beneficiaries) was greater than the rate for non-MSA residents (0.28/1,000) (rate ratio = 0.92. 95 percent CI = 0.88-0.97). The slopes of the regression equations fitted to the discharge rates for the 5 year period decreased significantly for both geographic groups, with the decrease in non-MSA residents being significantly greater (Figure 5).

30-Day Post-Admission Mortality Rates:

In 1990, the 30-day post-admission mortality rate among the MSA residents (101.40 deaths/1,000 discharges) was not significantly different from that observed in the non-MSA residents (108.50/1,000). However, the trend in the 30-day post-admission mortality rate for MSA residents was significantly less than zero, although it was not different from the slope for the non-MSA residents (Figure 6).

Table 2. Diabetic ketoacidosis: Number of discharges per 1,000 beneficiaries, number of 30-day post-admission deaths per 1,000 discharges, and selected statistical tests of the rates and trends, by demographic and geographic groups, for Medicare beneficiaries 65 years of age and older, U.S., 1986-90.

	Discharge Rates					30-day Post-admission Mortality Rates				
				Tests of Slopes					Tests of Slopes	
Demographic or Geographic Group	1990 1/ Rate	Rate 2/ Ratio	95% CI	5 yr 3/ Slope	Difference 4/ in Slopes	1990 1/ Rate	Rate 2/ Ratio	95% CI	5 yr 3/ Slope	Difference 4/ in Slopes
All Beneficiaries	0.29	--	--	-0.02 **	--	104.00	--	--	-2.95	--
Race and Sex										
White Male	0.20	reference		-0.02 **	reference	120.20	reference		-1.20	reference
White Female	0.29	1.45	(1.37,1.52)	-0.02 **	NS	102.00	0.85	(0.73,0.98)	-3.01	NS
Black Male	0.77	3.88	(3.55,4.24)	-0.01	NS	89.44	0.74	(0.57,0.98)	-9.02 *	NS
Black Female	0.82	4.10	(3.81,4.42)	-0.06 **	**	91.76	0.76	(0.61,0.96)	-1.56	NS
Age										
65-74	0.28	reference		-0.02 **	reference	71.03	reference		-2.54	reference
75-84	0.33	1.18	(1.12,1.23)	-0.03 **	NS	121.40	1.71	(1.48,1.98)	-2.52	NS
85+	0.28	0.99	(0.92,1.06)	-0.03 **	NS	213.30	3.00	(2.53,3.56)	-5.59	NS
Geographic Area										
MSA	0.30	reference		-0.02 **	reference	101.40	reference		-3.99 *	reference
Non-MSA	0.28	0.92	(0.88,0.97)	-0.03 **	**	108.50	1.07	(0.93,1.24)	-0.88	NS

1/ Rates for race and sex groups and all beneficiaries are age-adjusted using 1986 as a standard.
2/ The rate ratio is the reference group rate divided by the sub-group rate.
3/ The null hypothesis is that the slope equals zero.
4/ The null hypothesis is that the slope of each sub-group is not different from the reference sub-group.

* $p < 0.05$
** $p < 0.01$

Figure 1. Diabetic Ketoacidosis
Discharge Rates for Medicare Beneficiaries
65 Years of Age and Older, by Race and Sex, U.S., 1986-90

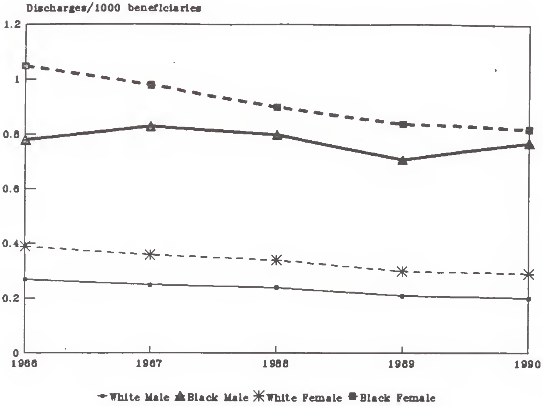


Figure 2. Diabetic Ketoacidosis
30-Day Post-Admission Mortality Rates for Medicare Beneficiaries
65 Years of Age and Older, by Race and Sex, U.S., 1986-90

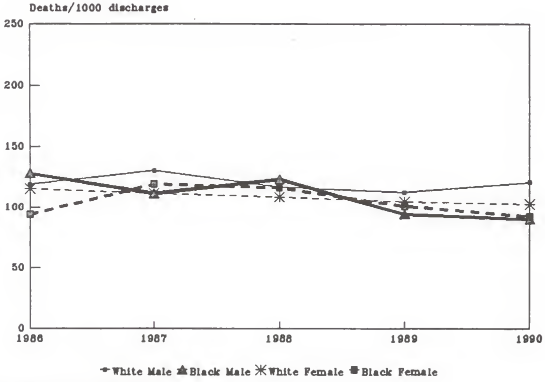


Figure 3. Diabetic Ketoacidosis
Discharge Rates for Medicare Beneficiaries
65 Years of Age and Older, by Age, U.S., 1986–90

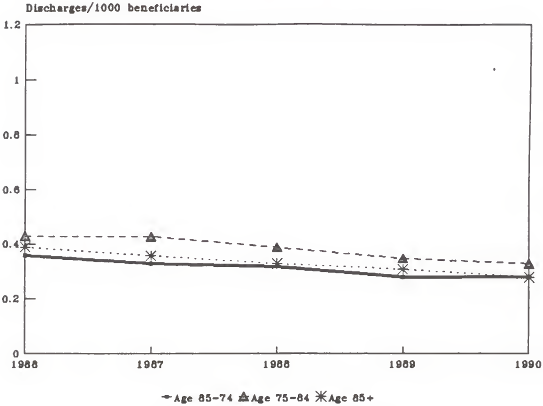


Figure 4. Diabetic Ketoacidosis
30–Day Post–Admission Mortality Rates for Medicare Beneficiaries
65 Years of Age and Older, by Age, U.S., 1986–90

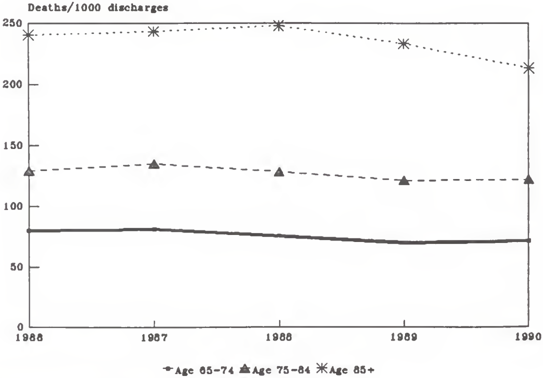


Figure 5. Diabetic Ketoacidosis
Discharge Rates for Medicare Beneficiaries
65 Years of Age and Older, by Geographic Area, U.S., 1986-90

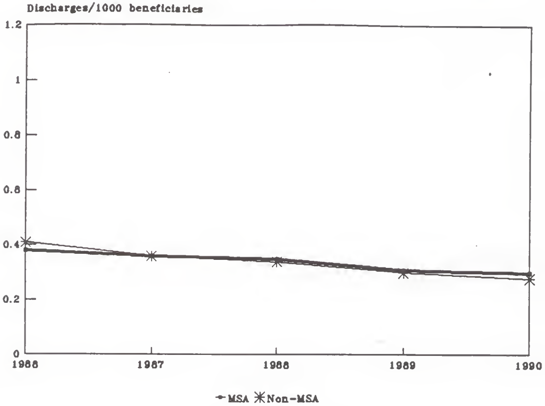
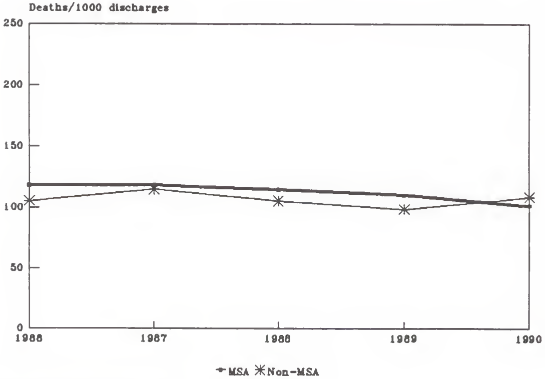


Figure 6. Diabetic Ketoacidosis
30-Day Post-Admission Mortality Rates for Medicare Beneficiaries
65 Years of Age and Older, by Geographic Area, U.S., 1986-90



Hypertension (HTN)

Race and Sex

Discharge Rates:

The discharge rate for HTN varied four and one-half-fold across the four race-sex groups in 1990. The overall rate was 0.83 discharges per 1,000 beneficiaries. White men had significantly lower discharge rates for HTN (0.47/1,000) than white women (0.95/1,000), black men (1.23/1,000) and black women (2.10/1,000) (Table 2). The rate ratios comparing the discharge rates for white men with white women, black men and black women were 2.04, 2.64 and 4.50, respectively. However, it is important to observe remember that the prevalence of HTN is greater in elderly women than in elderly men and higher in black beneficiaries than in white beneficiaries. A measure of these differences in the Medicare hospital data is the 1990 rate ratio of discharges per 1,000 persons with the diagnosis of HTN in one of the five diagnotic positions for men compared with women and white persons compared with black persons in 1990. HTN was listed 1.20 times more frequently for white women than white males (53.08 discharges/1,000 white women versus 44.23 discharges/1,000 white men) and 1.50 times more frequently for black beneficiaries than white beneficiaries (74.37 discharges/1,000 black beneficiaries versus 49.52 discharges/1,000 white beneficiaries) (data not shown).

During the 5 year period, the trend in discharge rates for HTN showed a significant decrease in all race-sex groups (Table 2 and Figure 1). The slopes observed for white females and black females decreased significantly more than the slope for white males.

30-day Post-Admission Mortality Rates:

The experience for white women appears to be better with regard to 30-day post-admission mortality rates compared to experience for the other three race-sex groups. In 1990 white women had the lowest 30-day post-admission mortality rate (6.29 deaths/1,000 discharges), which was approximately 55 to 60 percent that of the three other race-sex groups and statistically lower than that for white men (rate ratio=0.55 95 percent CI=0.39-0.77). Over the 5 year period, white women had the only slope of 30-day post-admission mortality rates that was significantly lower than zero, although the slope was not statistically different than that for white men (Figure 2). The decline observed in mortality rates is consistent with the decrease in mortality due to HTN and hypertensive cardiovascular disease reported in many studies. The decrease is attributed to improved screening, diagnosis, treatment and follow-up of persons with HTN which began in the 1970s largely due to initiatives of the National Heart Lung and Blood Institute and private voluntary organizations such as the American Heart Association.

Age

Discharge Rates:

The discharge rate for HTN for persons 65-74 years of age (0.73 discharges/1,000 beneficiaries) was significantly less than that for persons 75-84 year of age (1.00/1,000) (rate ratio = 1.37, 95 percent CI = 1.34-1.41), and for persons 85 and above (0.92/1,000) (rate ratio = 1.27, 95 percent CI = 1.21-1.32) (Table 2). The trend in the rates of HTN showed a significant decrease in all three age groups over the 5 year period, and the slopes were similar in all groups (Table 2 and Figure 3).

30-Day Post-Admission Mortality Rates:

In 1990, the oldest age group had a significantly higher 30-day post-admission mortality rate, 15.54 deaths/1,000 discharges, than persons 65-74 years of age (6.61/1,000). The 1990 discharge rates were similar for the 65-74 year old beneficiaries and the 75-84 year old beneficiaries. None of the trends in 30-day post admission mortality rates were different from zero, nor were they different one from the other.

Geographic Area

Discharge Rates:

In 1990, the discharge rate for HTN per 1,000 beneficiaries for non-MSA residents was 40.0 percent greater than the rate for MSA residents (0.75/1,000 versus 1.05/1,000) (rate ratio = 1.40. 95 percent CI = 1.36 - 1.43). The slopes of the discharge rates for the 5 year period decreased significantly for both geographic groups, with the decrease in non-MSA residents being greater (Figure 5).

30-Day Post-Admission Mortality Rates:

In 1990, the 30-day post-admission mortality rate among the MSA residents (8.46 deaths/1,000 discharges) was not different from that observed in the non-MSA residents (8.05/1,000). The trend in the 30-day post-admission mortality rates for both geographic groups was not significantly different from zero, nor were the slopes different from each other (Figure 6).

Table 2. Hypertension: Number of discharges per 1,000 beneficiaries, number of 30-day post-admission deaths per 1,000 discharges, and selected statistical tests of the rates and trends, by demographic and geographic groups, for Medicare beneficiaries 65 years of age and older, U.S., 1986-90.

	Discharge Rates					30-day Post-admission Mortality Rates				
				Tests of Slopes					Tests of Slopes	
Demographic or Geographic Group	1990 Rate 1/	Rate Ratio 2/	95% CI	5 yr Slope 3/	Difference in Slopes 4/	1990 Rate 1/	Rate Ratio 2/	95% CI	5 yr Slope 3/	Difference in Slopes 4/
All Beneficiaries	0.83	--	--	-0.10 *	--	8.14	--	--	-0.84	--
Race and Sex										
White Male	0.47	reference		-0.05 **	reference	11.43	reference		-1.20	reference
White Female	0.95	2.04	(1.97,2.11)	-0.11 **	**	6.29	0.55	(0.39,0.77)	-0.85 *	NS
Black Male	1.23	2.64	(2.47,2.82)	-0.14 **	NS	11.14	0.98	(0.52,1.84)	-0.52	NS
Black Female	2.10	4.50	(4.29,4.72)	-0.24 **	**	10.78	0.94	(0.60,1.48)	0.00	NS
Age										
65-74	0.73	reference		-0.10 **	reference	6.61	reference		-0.48	reference
75-84	1.00	1.37	(1.34,1.41)	-0.10 **	NS	8.31	1.26	(0.91,1.73)	-1.00	NS
85+	0.92	1.27	(1.21,1.32)	-0.08 **	NS	15.54	2.35	(1.61,3.42)	-1.97	NS
Geographic Area										
MSA	0.75	reference		-0.08 **	reference	8.46	reference		-0.88	reference
Non-MSA	1.05	1.40	(1.36,1.43)	-0.13 **	*	8.05	0.95	(0.71,1.28)	-0.48	NS

1/ Rates for race and sex groups and all beneficiaries are age-adjusted using 1986 as a standard.

2/ The rate ratio is the reference group rate divided by the sub-group rate.

3/ The null hypothesis is that the slope equals zero.

4/ The null hypothesis is that the slope of each sub-group is not different from the reference sub-group.

* $p < 0.05$

** $p < 0.01$

Figure 1. Hypertension Discharge Rates for Medicare Beneficiaries 65 Years of Age and Older, by Race and Sex, U.S., 1986-90

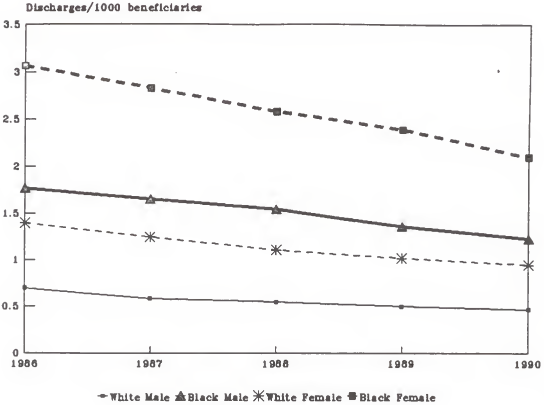


Figure 2. Hypertension 30-Day Post-Admission Mortality Rates for Medicare Beneficiaries 65 Years of Age and Older, by Race and Sex, U.S., 1986-90

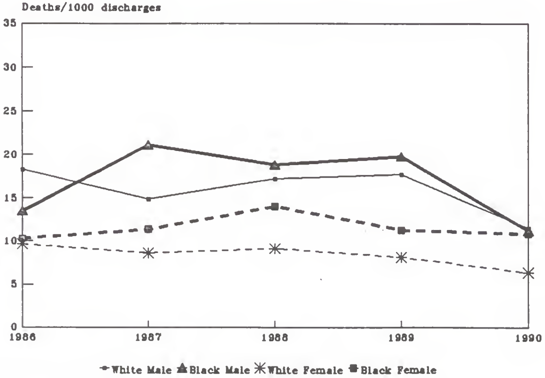


Figure 3. Hypertension
Discharge Rates for Medicare Beneficiaries
65 Years of Age and Older, by Age, U.S., 1986-90

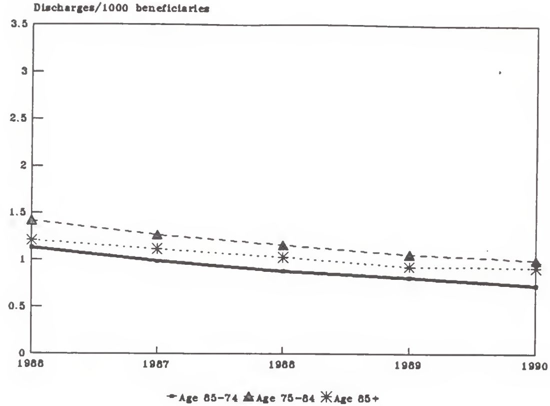


Figure 4. Hypertension
30-Day Post-Admission Mortality Rates for Medicare Beneficiaries
65 Years of Age and Older, by Age, U.S., 1986-90

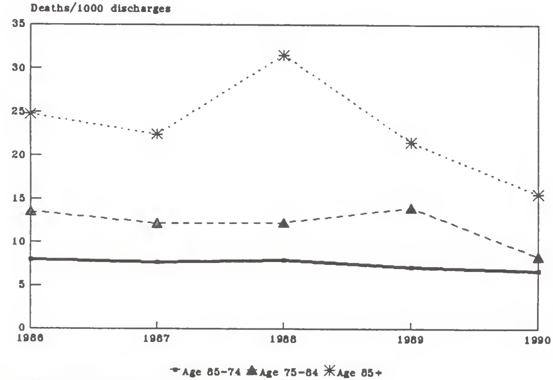


Figure 5. Hypertension
Discharge Rates for Medicare Beneficiaries 65 Years of Age and Older, by Geographic Area, U.S., 1986–90

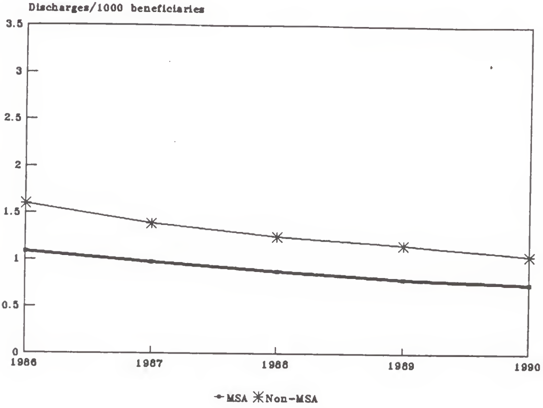
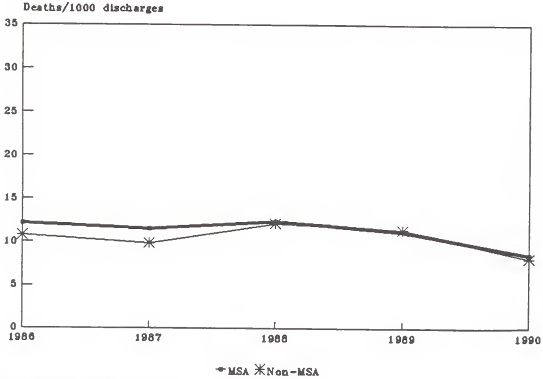


Figure 6. Hypertension
30–Day Post–Admission Mortality Rates for Medicare Beneficiaries 65 Years of Age and Older, by Geographic Area, U.S., 1986–90



Congestive Heart Failure (CHF)

Race and Sex

Discharge Rates:

In 1990 there were over 1.3 million persons discharged who had CHF listed in any one of the five diagnostic fields on the MEDPAR file. Over one-half million had CHF listed as the principal diagnosis. Thus, compared with HTN and DKA, CHF is 22.2 (18.44/0.83) to 63.6 (18.44/0.29) times more frequently a cause for hospitalization among elderly Medicare beneficiaries.

In 1990, the lowest discharge rate for any of the race-sex groups was among white females (16.88 discharges/1,000 women). This rate was between 13 and 28 percent lower than the rate observed for the other three race-sex groups, and it was significantly different from white men.

During the 5 year period, the discharge rates for CHF showed a small but significantly increasing trend in all four race-sex groups (Table 2 and Figure 1). There was no difference between the trends for white males and the other race-sex groups.

30-day Post-Admission Mortality Rates:

In 1990, white men had the highest 30-day post-admission mortality rate (118.60 deaths/1,000 discharges). This was statistically higher than the 30-day post-admission mortality rates for each of the other race-sex groups; with a rate ratio of 0.89 for white women, 0.66 for black men, and 0.62 for black women.

Concurrent with the positive slopes for the rates of CHF discharges, there were decreasing trends in the 30-day post-admission mortality rates for all race-sex groups. The decrease was significant for white males and white females (Table 2 and Figure 2). The slope of the equation for the reference group, white men, was not different from the slopes for any of the other three groups.

Age

Discharge Rates:

As expected, persons 65-74 years old had significantly lower discharge rates for CHF in 1990 (10.80 discharges/1,000 beneficiaries), than either the 75-84 year olds (24.36/1,000), or persons 85 and above (41.96/1,000) (Table 2). The trend in discharge rates for CHF showed a significant increase in all three age groups over the 5 year period. The slope for persons 65-74 years of age was not significantly different than that for older persons (Figure 3).

30-Day Post-Admission Mortality Rates:

In 1990, the two older age groups had significantly higher rates of 30-day post-admission deaths per 1,000 discharges, 105.90/1,000 and 152.30/1,000, respectively, than persons 65-74 years of age (78.27/1,000). During the 5 year period, the slopes of 30-day post-admission mortality rates for all groups were significantly less than zero. The rate of reduction in the 30-day post-admission mortality rate was significantly more in the oldest age group than in the 65-74 age group (Table 2 and Figure 4).

Geographic Area

Discharge Rates:

The discharge rate for CHF in 1990 MSA residents (18.07 discharges/1,000 beneficiaries) was lower than the rate for non-MSA residents (19.42/1,000). The slopes of the discharge rates were significantly different from zero for the MSA and the non-MSA residents, but they were not different from each other (Figure 5).

30-Day Post-Admission Mortality Rates:

In 1990, the 30-day post-admission mortality rate among the non-MSA residents (110.20 deaths/1,000 discharges) was only 3 percent higher than the rate among the MSA residents (106.90/1,000). However, because of the large numbers of deaths from CHF in the elderly population, this difference was statistically significant. Over the 5 year period the decreasing trend in the 30-day post-admission mortality rates for the two geographic area groups were statistically different from zero, but they were not different from each other (Figure 6).

Table 2. Congestive heart failure: Number of discharges per 1,000 beneficiaries, number of 30-day post-admission deaths per 1,000 discharges, and selected statistical tests of the rates and trends, by demographic and geographic groups, for Medicare beneficiaries 65 years of age and older, U.S., 1986-90.

	Discharge Rates					30-day Post-admission Mortality Rates				
				Tests of Slopes					Tests of Slopes	
Demographic or Geographic Group	1990 1/ Rate	Rate 2/ Ratio	95% CI	5 yr 3/ Slope	Difference 4/ in Slopes	1990 1/ Rate	Rate 2/ Ratio	95% CI	5 yr 3/ Slope	Difference 4/ in Slopes
All Beneficiaries	18.32	--	--	0.16 *	--	107.80	--	--	-5.70 *	--
Race and Sex										
White Male	19.40	reference		0.14 *	reference	118.60	reference		-6.32 **	reference
White Female	16.88	0.87	(0.87,0.88)	0.11 *	NS	105.60	0.89	(0.88,0.91)	-5.68 **	NS
Black Male	23.36	1.20	(1.19,1.22)	0.52 *	NS	78.50	0.66	(0.63,0.70)	-3.72	NS
Black Female	23.23	1.20	(1.18,1.21)	0.57 **	NS	73.18	0.62	(0.59,0.64)	-3.29	NS
Age										
65-74	10.80	reference		0.14 **	reference	78.27	reference		-4.84 **	reference
75-84	24.36	2.26	(2.24,2.27)	0.15 **	NS	105.90	1.35	(1.33,1.38)	-5.96 **	NS
85+	41.96	3.89	(3.86,3.91)	0.28 **	NS	152.30	1.95	(1.91,1.99)	-6.60 **	*
Geographic Area										
MSA	18.07	reference		0.22 **	reference	106.90	reference		-5.75 **	reference
Non-MSA	19.42	1.07	(1.07,1.08)	0.17 *	NS	110.20	1.03	(1.01,1.05)	-5.30 **	NS

1/ Rates for race and sex groups and all beneficiaries are age-adjusted using 1986 as a standard.
2/ The rate ratio is the reference group rate divided by the sub-group rate.
3/ The null hypothesis is that the slope equals zero.
4/ The null hypothesis is that the slope of each sub-group is not different from the reference sub-group.

* $p < 0.05$
** $p < 0.01$

Figure 1. Congestive Heart Failure
Discharge Rates for Medicare Beneficiaries
65 Years of Age and Older, by Race and Sex, U.S., 1986-90

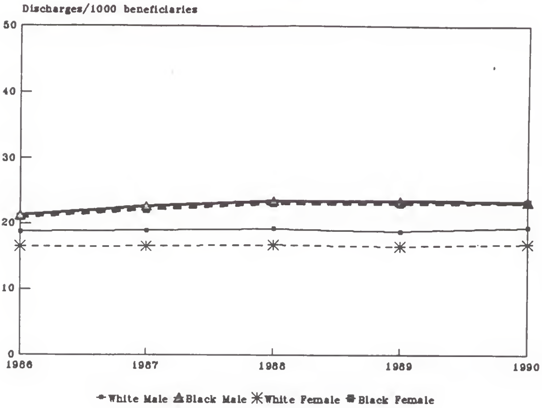


Figure 2. Congestive Heart Failure
30-Day Post-Admission Mortality Rates for Medicare Beneficiaries
65 Years of Age and Older, by Race and Sex, U.S., 1986-90

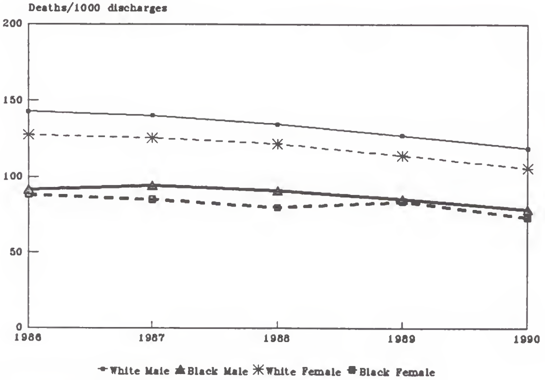


Figure 3. Congestive Heart Failure
Discharge Rates for Medicare Beneficiaries
65 Years of Age and Older, by Age, U.S., 1986-90

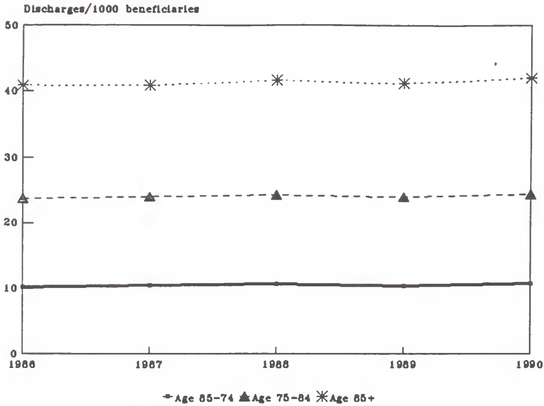


Figure 4. Congestive Heart Failure
30-Day Post-Admission Mortality Rates for Medicare Beneficiaries
65 Years of Age and Older, by Age, U.S., 1986-90

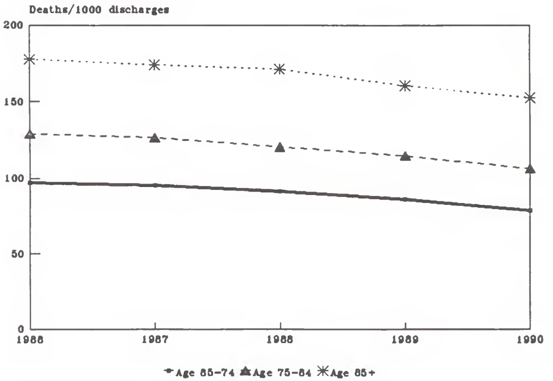


Figure 5. Congestive Heart Failure Discharge Rates for Medicare Beneficiaries 65 Years of Age and Older, by Geographic Area, U.S., 1986–90

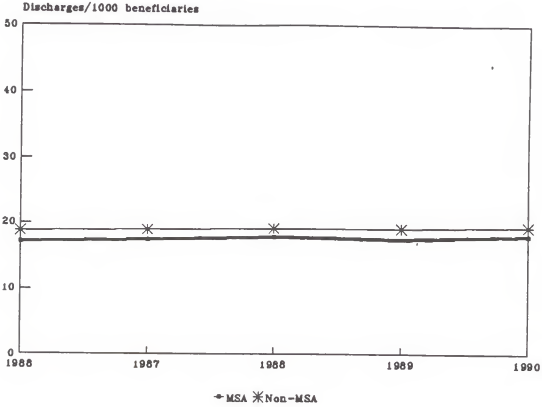
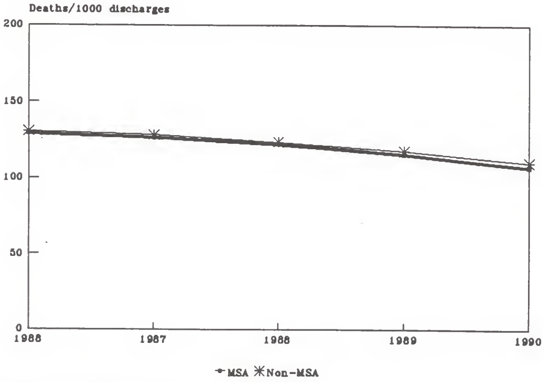


Figure 6. Congestive Heart Failure 30–Day Post–Admission Mortality Rates for Medicare Beneficiaries 65 Years of Age and Older, by Geographic Area, U.S., 1986–90



Asthma

Race and Sex

Discharge Rates:

The discharge rate for asthma varied by over twofold across the four race-sex groups. In 1990, the overall rate was 2.67 discharges per 1,000 beneficiaries. White men had significantly lower discharge rates for asthma (2.03/1,000) in 1990 than the other race-sex group (Table 2). White women had approximately 40 percent higher rates (2.89/1,000); black men had 72 percent higher rates (3.49/1,000); and black women had 229 percent higher rates (4.65/1,000).

During the 5 year period, the trend in discharge rates for asthma showed a significant increase for black women, the race-sex group which began with the highest discharge rate in 1986. Conversely, white men, who had the lowest rate in 1986, had a significantly decreasing trend in their discharge rate over the 5 year period. There were, however, no differences between the slopes of the reference group, white males, and the other race-sex groups (Table 2 and Figure 1).

30-day Post-Admission Mortality Rates:

In 1990, white men had the highest 30-day post-admission mortality rate (27.27 deaths/1,000 discharges). This was similar to the 30-day post-admission mortality rate in black men, 27.74 (rate ratio of black men/white men = 1.02, 95 percent CI 0.81-1.28). In addition, as shown in Figure 2, men of both races had higher 30-day post-admission mortality rates following hospitalization for asthma than women of the same race (18.65/1,000 for white women and 13.43/1,000 for black women).

Over the 5 year period, the slopes of the equations fitted to the 30-day post-admission mortality rates for the four race-sex groups were not significantly different from zero nor was the slope of white males different from any of the other three groups (Table 2, Figure 2).

Age

Discharge Rates:

Persons 75-84 years old had significantly higher discharge rates for asthma in 1990 (2.94 discharges/1,000 beneficiaries) than persons 65-74 years old (2.60/1,000) (Table 2). The discharge rates for asthma showed a significantly decreasing trend in the youngest age group and a significantly increasing trend in the oldest age group over the 5 year period. None of the slopes was, however, significantly different from the slope of the youngest age group (Figure 3).

30-Day Post-Admission Mortality Rates:

In 1990, as shown in Table 2 and Figure 4, the youngest age group had the lowest 30-day post-admission mortality rate, 14.96 deaths/1,000 discharges. The 30-day post-admission mortality rate was 73 percent greater in persons 75-84 years of age (25.92/1,000) and 320 percent greater in persons 85 years of age and older (47.91/1,000). None of the trends in the 30-day post-admission mortality rates was significantly different from zero, nor were they significantly different from the slope of the youngest age group.

Geographic Area

Discharge Rates:

The discharge rate for asthma in 1990 for non-MSA residents (2.82 discharges/1,000 beneficiaries) was 7 percent higher than the rate for MSA residents (2.63/1,000). Over the 5 year period, the slope describing the discharge rates decreased significantly for the non-MSA residents but not for the MSA residents. There was, however, no difference in the trends for the two groups (Figure 5).

30-Day Post-Admission Mortality Rates:

In 1990, the 30-day post-admission mortality rate among the MSA residents (22.76 deaths/1,000 discharges) was significantly higher than among the non-MSA residents (19.61/1,000). Hence, the group which had the lowest discharge rate had the highest 30-day post-admission mortality rate. The increasing trend in the mortality rate for the MSA residents was significantly different from zero, although it was not different from the slope for the non-MSAs (Figure 6).

Table 2. Asthma: Number of discharges per 1,000 beneficiaries, number of 30-day post-admission deaths per 1,000 discharges, and selected statistical tests of the rates and trends, by demographic and geographic groups, for Medicare beneficiaries 65 years of age and older, U.S., 1986-90.

	Discharge Rates					30-day Post-admission Mortality Rates				
				Tests of Slopes					Tests of Slopes	
Demographic or Geographic Group	1990 1/ Rate	Rate 2/ Ratio	95% CI	5 yr 3/ Slope	Difference 4/ in Slopes	1990 1/ Rate	Rate 2/ Ratio	95% CI	5 yr 3/ Slope	Difference 4 in Slopes
All Beneficiaries	2.67	--	--	-0.03	--	21.04	--	--	0.23	--
Race and Sex										
White Male	2.03	reference		-0.08 **	reference	27.27	reference		0.60	reference
White Female	2.89	1.42	(1.40,1.45)	-0.01	NS	18.65	0.68	(0.62,0.76)	0.15	NS
Black Male	3.49	1.72	(1.65,1.79)	0.01	NS	27.74	1.02	(0.81,1.28)	0.98	NS
Black Female	4.65	2.29	(2.22,2.36)	0.11 *	NS	13.43	0.49	(0.39,0.62)	-0.46	NS
Age										
65-74	2.60	reference		-0.07 **	reference	14.96	reference		0.14	reference
75-84	2.94	1.13	(1.11,1.15)	0.00	NS	25.92	1.73	(1.55,1.93)	0.42	NS
85+	2.26	0.87	(0.85,0.89)	0.08 *	NS	47.91	3.20	(2.80,3.66)	-0.14	NS
Geographic Area										
MSA	2.63	reference		-0.02	reference	22.76	reference		0.42 *	reference
Non-MSA	2.82	1.07	(1.06,1.09)	-0.06 *	NS	19.61	0.86	(0.77,0.96)	0.51	NS

1/ Rates for race and sex groups and all beneficiaries are age-adjusted using 1986 as a standard.
2/ The rate ratio is the reference group rate divided by the sub-group rate.
3/ The null hypothesis is that the slope equals zero.
4/ The null hypothesis is that the slope of each sub-group is not different from the reference sub-group.

* $p < 0.05$
** $p < 0.01$

Figure 1. Asthma
Discharge Rates for Medicare Beneficiaries 65 Years of Age and Older, by Race and Sex, U.S., 1986-90

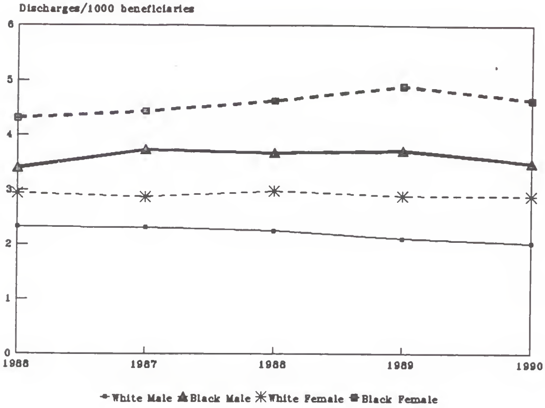


Figure 2. Asthma
30-Day Post-Admission Mortality Rates for Medicare Beneficiaries 65 Years of Age and Older, by Race and Sex, U.S., 1986-90

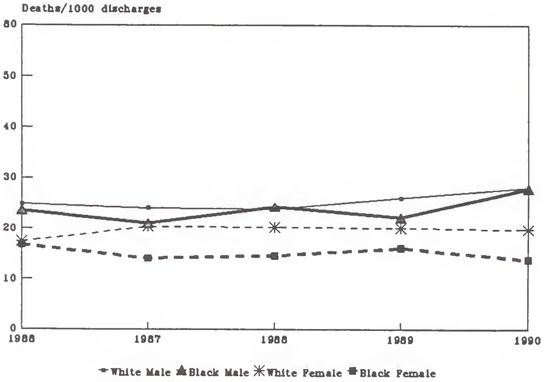
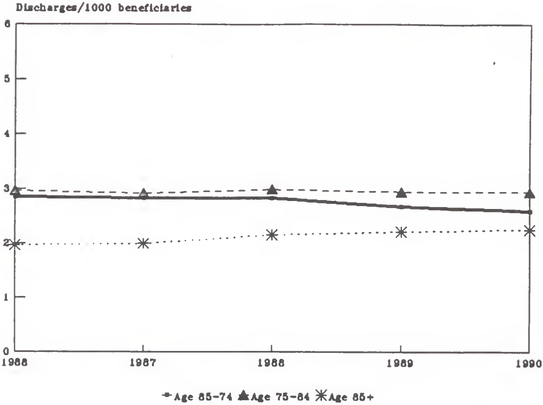


Figure 3. Asthma
Discharge Rates for Medicare Beneficiaries
65 Years of Age and Older, by Age, U.S., 1986-90



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65 Years of Age and Older, by Age, U.S., 1986-90

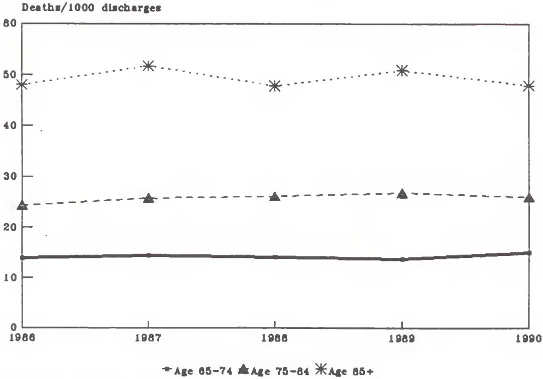


Figure 5. Asthma
Discharge Rates for Medicare Beneficiaries 65 Years of Age and Older, by Geographic Area, U.S., 1986-90

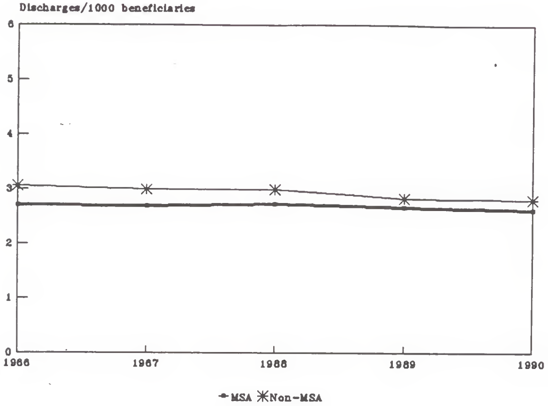
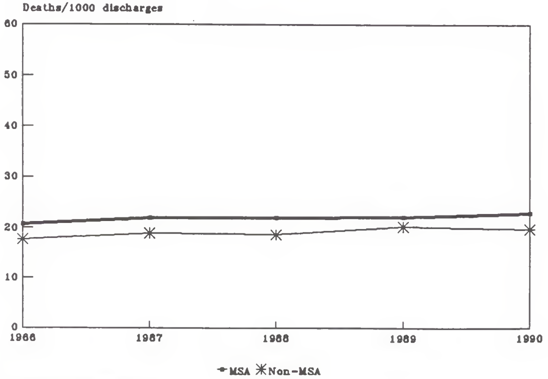


Figure 6. Asthma
30-Day Post-Admission Mortality Rates for Medicare Beneficiaries 65 Years of Age and Older, by Geographic Area, U.S., 1986-90



Transient Ischemic Attack (TIA)

Race and Sex

Discharge Rates:

In 1990, the overall discharge rate for TIA was 3.97 discharges per 1,000 beneficiaries. White men had only slightly lower discharge rates for TIA (3.86/1,000) than white women (3.98/1,000) or black men (3.94/1,000), although the rate in black women, 4.64, was 20 percent greater that in white men. The 3 percent difference between the white race-sex subgroups was significant, but the 2 percent difference in the rates for white men and black men was not (Table 2).

During the 5 year period, the trend in the discharge rates for TIA showed a significant decrease in all four race-sex groups (Table 2). The decreasing slope for white males was significantly different from the slopes for the black male and black female race-sex subgroups (Table 2 and Figure 1).

30-day Post-Admission Mortality Rates:

In 1990, white women had the lowest 30-day post-admission mortality rate (10.56 deaths/1,000 discharges). This was not statistically lower than the 30-day post-admission mortality rate in black women, 10.89 (statistical calculation not shown). In addition, the white women and black women had lower 30-day post admission mortality rates following hospitalization for TIA than men of the same race (10.56/1,000 for white women versus 13.77/1,000 for white men; and 10.89/1,000 for black women versus 17.22/1,000 for black men).

During the 5 year period, the slope of the 30-day post-admission mortality rates decreased significantly for white women. For the other three race-sex subgroups, the slope was not significantly different from zero. None of the slopes was significantly different from the reference group, white males (Figure 2).

Age

Discharge Rates:

Persons 65-74 years old had significantly lower discharge rates for TIA in 1990 (2.38 discharges/1,000 beneficiaries), than either the 75-84 year olds (5.39/1,000), or persons 85 and above (8.51/1,000) (Table 2). The trends in the rates of hospitalization for TIA showed a significant decrease in all three age groups over the 5 year period. The decrease in the slope for persons 85 years of age and older was the greatest of the three age groups. The slope for persons 65-74 years of age was significantly lower than that for persons in either of the two older age groups (Figure 3).

30-Day Post-Admission Mortality Rates:

In 1990, the two older age groups had significantly higher rates of 30-day post-admission deaths per 1,000 discharges, 11.29 and 22.58, respectively, than persons 65-74 years of age (6.01/1,000). During the 5 year period, slopes of 30-day post-admission mortality rates did not differ significantly from zero for all three age groups, and there was no difference found between the slope for 65-74 year olds and the older age groups.

Geographic Area

Discharge Rates:

The discharge rate for TIA in 1990 for non-MSA residents (4.34 discharges/1,000 beneficiaries) was 13 percent higher than the rate for MSA residents (3.85/1,000). Over the 5 year period, the slope describing the discharge rates decreased significantly for the residents of both geographic areas, and the decreasing trend was significantly greater for non-MSA residents. Thus, the rates for the two groups are coming closer together over time (Figure 5).

30-Day Post-Admission Mortality Rates:

In 1990, the 30-day post-admission mortality rate among the MSA residents (12.55 deaths/1,000 discharges) was significantly higher, 15.8 percent, than among the non-MSA residents (10.84/1,000). Hence, the group that had the lowest discharge rate had the highest 30-day post-admission mortality rate. The decreasing trends in the mortality rates for the MSA and non-MSA residents were not significantly different from zero, nor were they different one from the other (Figure 6).

Table 2. Transient ischemic attack: Number of discharges per 1,000 beneficiaries, number of 30-day post-admission deaths per 1,000 discharges, and selected statistical tests of the rates and trends, by demographic and geographic groups, for Medicare beneficiaries 65 years of age and older, U.S., 1986-90.

	Discharge Rates					30-day Post-admission Mortality Rates				
				Tests of Slopes					Tests of Slopes	
Demographic or Geographic Group	1990 1/ Rate	Rate 2/ Ratio	95% CI	5 yr 3/ Slope	Difference 4/ in Slopes	1990 1/ Rate	Rate 2/ Ratio	95% CI	5 yr 3/ Slope	Difference 4/ in Slopes
All Beneficiaries	3.97	--	--	-0.30 **	--	11.94	--	--	-0.39	--
Race and Sex										
White Male	3.86	reference		-0.29 **	reference	13.77	reference		-0.31	reference
White Female	3.98	1.03	(1.02,1.05)	-0.31 **	NS	10.56	0.77	(0.68,0.86)	-0.51 **	NS
Black Male	3.94	1.02	(0.99,1.06)	-0.17 **	*	17.22	1.25	(0.95,1.64)	0.70	NS
Black Female	4.64	1.20	(1.17,1.24)	-0.23 **	*	10.89	0.79	(0.61,1.02)	-0.08	NS
Age										
65-74	2.38	reference		-0.17 **	reference	6.01	reference		-0.26	reference
75-84	5.39	2.27	(2.24,2.30)	-0.41 **	**	11.29	1.88	(1.61,2.20)	-0.34	NS
85+	8.51	3.58	(3.52,3.63)	-0.62 **	**	22.58	3.76	(3.22,4.39)	-0.62	NS
Geographic Area										
MSA	3.85	reference		-0.24 **	reference	12.55	reference		-0.35	reference
Non-MSA	4.34	1.13	(1.11,1.14)	-0.39 **	**	10.84	0.86	(0.77,0.98)	-0.34	NS

1/ Rates for race and sex groups and all beneficiaries are age-adjusted using 1986 as a standard.
2/ The rate ratio is the reference group rate divided by the sub-group rate.
3/ The null hypothesis is that the slope equals zero.
4/ The null hypothesis is that the slope of each sub-group is not different from the reference sub-group.

* $p < 0.05$
** $p < 0.01$

Figure 1. Transient Ischemic Attack
Discharge Rates for Medicare Beneficiaries
65 Years of Age and Older, by Race and Sex, U.S., 1986-90

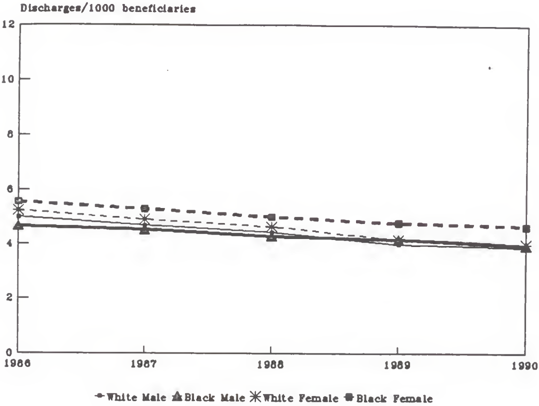


Figure 2. Transient Ischemic Attack
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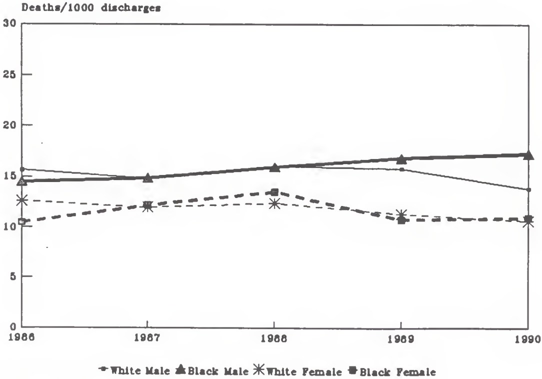

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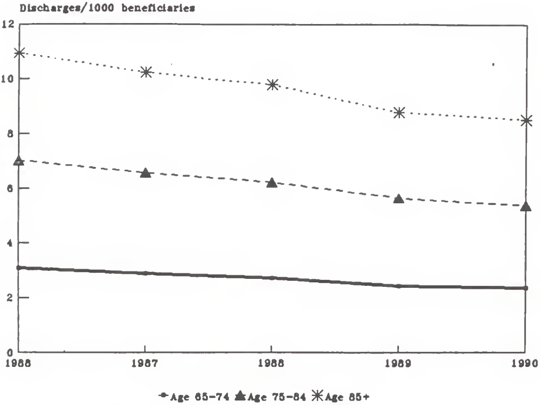
65 Years of Age and Older, by Age, U.S., 1986-90



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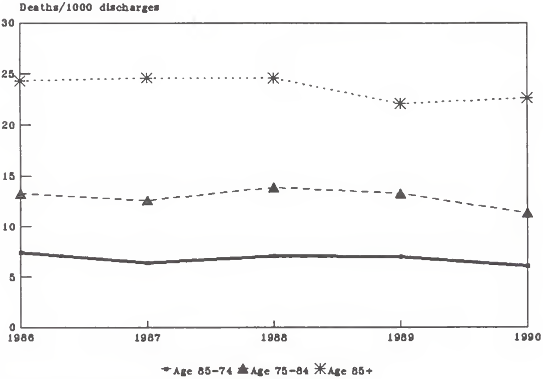

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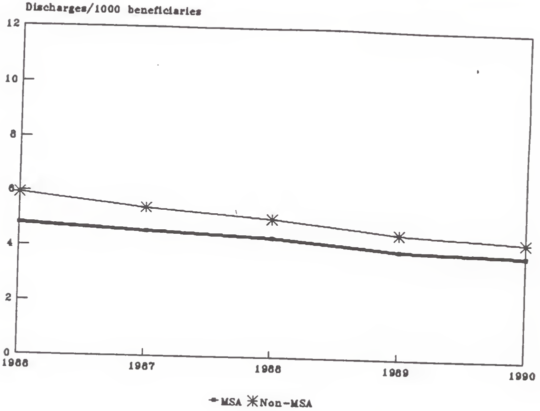

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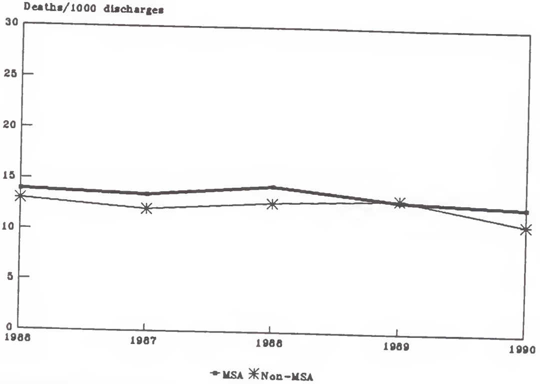

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